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June 10, 1966

U.S. GOVERNMENT

RESEARCH & DEVELOPMENT REPORTS

JUN 30 1966

Semi-Monthly Journal

- *Abstracts of R & D Reports*
- *List of Current R & D Projects*
- *Indexes*

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June 10, 1966 / Volume 41, Number 11

U.S. Government

RESEARCH AND DEVELOPMENT REPORTS

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John T. Connor, Secretary

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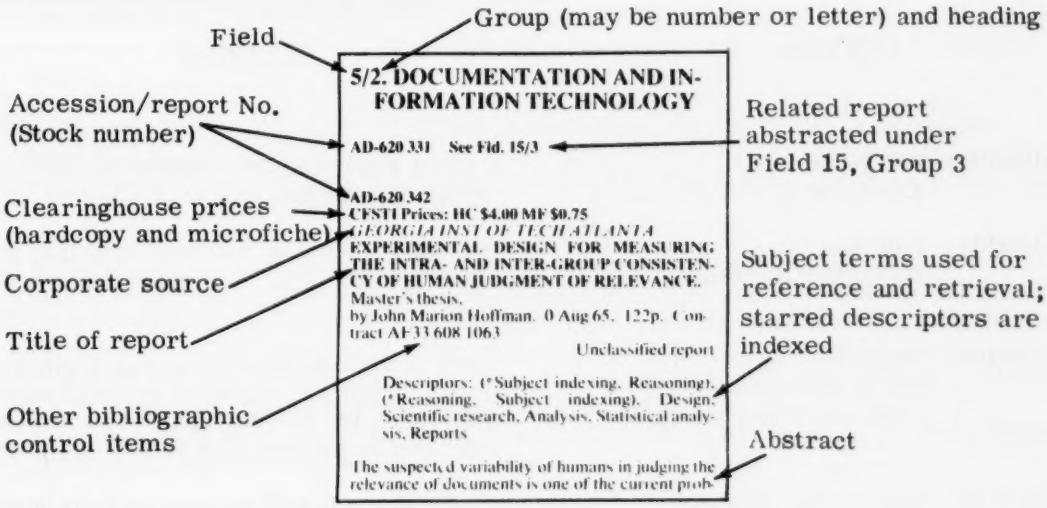
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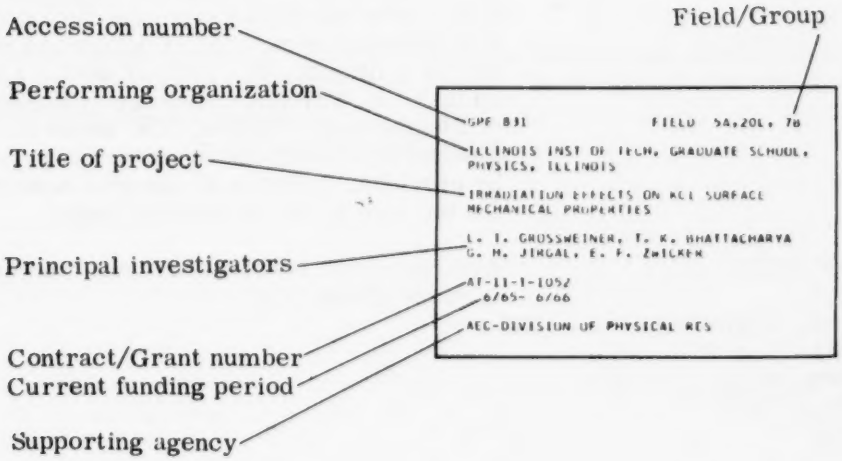

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02 AGRICULTURE 4, S-2

Includes agricultural chemistry; agricultural economics; agricultural engineering; agronomy and horticulture; animal husbandry; and forestry.

03 ASTRONOMY AND ASTROPHYSICS 4

Includes astronomy; astrophysics; and celestial mechanics.

04 ATMOSPHERIC SCIENCES 5, S-2

Includes atmospheric physics and meteorology.

05 BEHAVIORAL AND SOCIAL SCIENCES 8, S-4

Includes administration and management; documentation and information technology; economics; history, law and political science; human factors engineering; humanities; linguistics; man-machine relations; personnel selection, training, and evaluation; psychology (individual and group behavior); and sociology.

06 BIOLOGICAL AND MEDICAL SCIENCES 13, S-9

Includes biochemistry; bioengineering; biology; bionics; clinical medicine; environmental biology; escape, rescue, and survival; food; hygiene and sanitation; industrial (occupational) medicine; life support; medical and hospital equipment and supplies; microbiology; personnel selection and maintenance (medical); pharmacology; physiology; protective equipment; radiobiology; stress physiology; toxicology; and weapon effects.

07 CHEMISTRY. 21, S-11

Includes chemical engineering; inorganic chemistry; organic chemistry; physical chemistry; and radio and radiation chemistry.

08 EARTH SCIENCES AND OCEANOGRAPHY. 28, S-13

Includes biological oceanography; cartography; dynamic oceanography; geochemistry; geodesy; geography; geology and mineralogy; hydrology and limnology; mining engineering; physical oceanography; seismology; snow, ice, and permafrost; soil mechanics; and terrestrial magnetism.

09 ELECTRONICS AND ELECTRICAL ENGINEERING 34, S-15

Includes components; computers; electronic and electrical engineering; information theory; subsystems; and telemetry.

10 ENERGY CONVERSION (Non-Propulsive) 43, S-17

Includes conversion techniques; power sources; and energy storage.

11 MATERIALS. 43, S-18

Includes adhesives and seals; ceramics, refractories, and glasses; coatings, colorants, and finishes; composite materials; fibers and textiles; metallurgy and metallography; miscellaneous materials; oils, lubricants, and hydraulic fluids; plastics; rubbers; solvents, cleaners, and abrasives; and wood and paper products.

12 MATHEMATICAL SCIENCES. 48, S-20

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13 MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING. 51, S-22

Includes air conditioning, heating, lighting, and ventilating; civil engineering; construction equipment, materials, and supplies; containers and packaging; couplings, fittings, fasteners, and joints; ground transportation equipment; hydraulic and pneumatic equipment; industrial processes; machinery and tools; marine engineering; pumps, filters, pipes, tubing, fittings, and valves; safety engineering; and structural engineering.

14 METHODS AND EQUIPMENT. 56, S-30

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15 MILITARY SCIENCES 60, S-32

Includes antisubmarine warfare; chemical, biological, and radiological warfare; defense; intelligence; logistics; nuclear warfare; and operations, strategy, and tactics.

16 MISSILE TECHNOLOGY 61, S-32

Includes missile launching and ground support; missile trajectories; missile warheads and fuzes; and missiles.

17 NAVIGATION, COMMUNICATIONS, DETECTION, AND COUNTERMEASURES 62, S-32

Includes acoustic detection; communications; direction finding; electromagnetic and acoustic countermeasures; infrared and ultraviolet detection; magnetic detection; navigation and guidance; optical detection; radar detection; and seismic detection.

18 NUCLEAR SCIENCE AND TECHNOLOGY. 64, S-34

Includes fusion devices (thermonuclear); isotopes; nuclear explosions; nuclear instrumentation; nuclear power plants; radiation shielding and protection; radioactive wastes and fission products; radioactivity; reactor engineering and operation; reactor materials; reactor physics; reactors (power); reactors (non-power); and SNAP technology.

19 ORDNANCE 66, S-36

Includes ammunition, explosives; bombs; combat vehicles; explosions, ballistics, and armor; fire control and bombing systems; guns; rockets; and underwater ordnance.

20 PHYSICS 66, S-37

Includes acoustics; crystallography; electricity and magnetism; fluid mechanics; masers and lasers; optics; particle accelerators; particle physics; plasma physics; quantum theory; solid-mechanics; solid-state physics; thermodynamics and wave propagation.

21 PROPULSION AND FUELS 86, S-39

Includes air-breathing engines; combustion and ignition.

22 SPACE TECHNOLOGY 88, S-39

Includes astronautics; spacecraft; spacecraft trajectories and reentry; and spacecraft launch vehicles and ground support.

RESEARCH highlights

Reports of current high industrial interest

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Electrical

NBS REVISES HANDBOOK ON COPPER WIRE TABLES

(Order Stock No. NBS Handbook No. 100--Copper Wire Tables, HC $0.50/ MF $0.50.)

The National Bureau of Standards has revised its Circular 31 on Copper Wire Tables. The revision reflects changes in the nominal diameters of gages 45 and smaller and extends the tables to 56 gage. The changed diameters and extended range were established in 1961 by the Committee on Wires for Electrical Conductors of the American Society for Testing and Materials and were published as ASTM Standard B258-61. They have also been approved as American Standard C7.36-1961 by the American Standards Association. The first edition of Circular 31 was published in 1912 at the request of the American Institute of Electrical Engineers. Subsequent editions appeared in 1914 and 1956. The tables given in the new handbook are based upon standard values for the resistivity, temperature coefficient, and density of copper as adopted in 1913 by the International Electrotechnical Commission and disseminated as their Publication No. 28.

Electronic

ARMY DEVELOPS SOLID-STATE RADIATION METER

(Order Stock No. AD-629 709 Use of MOS Transistors in Solid-State Radiation Survey Meters, HC $1.00/MF $0.50.)

An all solid-state radiation survey meter constructed by the Army Electronics Command uses the metal oxide semiconductor (MOS) transistor to replace an electrometer tube. The solid-state meter requires no warm-up time and offers instantaneous operation as opposed to the electrometer tube which requires a warm-up of 2 to 20 minutes. The solid-state meter is lighter, the battery supply normally used for tube filaments being eliminated. As the state of the art advances, the cost of an MOS transistor for this application would be approximately one-half that of its electrometer counterpart. In addition, the reduction in battery drain achieved by eliminating the filament current will result in extended battery life. The survey meter uses one high-megohm resistor and has two scale ranges: 500 mr/hr and 50 mr/hr. Additional scale ranges can be obtained using additional high-megohm resistors.

SYSTEM PROPOSED FOR MARKING MILITARY ELECTRONIC PARTS

(Order Stock No. AD-629 544—A Study of Military Electronic and Electromechanical Specification Part Identification Requirements, HC $3.00/MF $0.75.)

A uniform system of marking military electronic and electromechanical specification parts has been recommended by the Air Force. Lack of uniform requirements for the marking of these military parts together with the progressive decrease in size of electronic components presents problems in identifying components for replacement and failure analysis. The marking of parts serves different purposes for different situations. For instance, marking can identify parts during evaluation testing, and before and during assembly. It can identify failed parts in the field for replacement and for failure analysis. Since size and available space on the part will affect what can be practically marked, the Air Force therefore recommends that the actual marking requirements be specified on the individual specification sheets. In conclusion, they recommend "that the Defense Standarization Manual M200A be revised and that MIL-STD-130 and MIL-STD-456 be revised to more adequately control the marking of parts." The Air Force report contains four appendices: Basic Marking Requirements in Specifications for Electronic and Electromechanical Parts; Evaluation of the Importance of the Different Elements of Part Marking Under Various Situations; Construction of Date Code in Specifications for Electronic and Electromechanical Parts; and Recommended Changes to MIL-STD-456A Electronic Parts, Date and Source Coding For.

Engineering and Construction

CONSTRUCTION INDUSTRY SHOULD USE HUMAN FACTORS CONCEPTS

(Order Stock No. AD-628 940 Human Factors as They Affect Methods Improvement in Construction, HC $3.00/MF $0.75.)

The construction industry can reap big benefits by applying industrial engineering techniques, a Stanford University study concludes. Available to the manager is a broad variety of proven techniques, including time-motion studies, crew-balance charts, time-lapse movies, value analysis, and others. There are problems involved in transferring these techniques from the shop to the construction site, but these problems can be overcome. The primary hurdles are mostly human factors problems, and the Stanford study analyzes these factors to offer construction management insight into human factors problem solving. Studied were such aspects as the following: needs and satisfaction of workers, productivity, involvement, and resistance to change. With the removal of these human problems, the new shop techniques can be the work simplifiers and profit makers they have been in shop industries.

Fuels

WESTERN COAL AND LIGNITE COULD BECOME COMPETITIVE

(Order Stock No. PB-169 315 The Potential Market for Far Western Coal and Lignite, Volume I, HC $8.00/MF $2.25; and PB-169 316, same title, Volume II, Appendices, HC $7.00/MF $1.75.)

Coal and lignite production in the Western States is virtually undeveloped but the potential is there for successful competition with fuels from other sections of the country, a survey made by Robert R. Nathan Associates for the U. S. Office of Coal Research discloses. The Nathan analysis of market potential looked into present supply and demand for coal and lignite and competitive fuels and sources of energy; significant elements affecting competitive position of Western coals and lignite; potential market for Western coal and lignite in 1980 by major producing area, market area, and end use; and additional market potential for Western coals and lignite on the assumption of favorable developments or actions.

Information Technology

AIR FORCE REVIEWS ITS DIRECTORATE OF INFORMATION SCIENCES

(Order Stock No. AD-630 521 Information Sciences, 1965, HC $4.00/MF $0.75.)

The 1965 annual report of the Air Force Directorate of Information Sciences discusses and reviews this office's research in information systems, informa-

tion identification and classification, transmission of information, adaptive and self-organizing systems, language and linguistics, and theoretical foundations of information sciences. Other areas worked in include materials, hardware components and assemblies, structure and behavior of biological systems, and large-scale man-machine and time-sharing interactions. One of the projects in information systems is oriented toward development of new approaches to the acquisition, processing, and dissemination of scientific information in the journal medium. Another project is directed toward systematizing methods of analyzing and evaluating operations in documentation systems and methods of assessing mechanization possibilities.

OMNITAB PROGRAM COMMUNICATES WITH COMPUTER IN SIMPLE ENGLISH

(Order Stock No. NBS Handbook 101--Omnitab, A Computer Program for Statistical and Numerical Analysis, HC $3.00/MF $1.25.)

A National Bureau of Standards monograph on the OMNITAB general-purpose digital computer program tells how this tool permits workers who are unfamiliar with programming to communicate with a large computer in a highly efficient manner by means of simple English sentences. The monograph describes characteristics, operation, and application and design of the program for statistical and numerical analysis of experimental data and for a wide variety of computations in applied mathematics, science, and engineering. Three important characteristics of the OMNITAB program have influenced the preparation of this work in the present format. The first of these is the generality of the program which permits its ready application to such diverse problems as frequency sharing of satellites, reference tables for thermocouples, the influence on range measurements of tropospheric refraction of radio waves, analysis and fitting of molecular spectra, and a variety of problems from biometrics to econometrics to sociology. The second feature is the interpretive character of the program which enables it to respond to simple English language instructions. This feature permits the use of the digital computer for nonprogrammers in a manner highly analogous to the way they use desk calculators. Finally, the conciseness of the instruction set for a wide class of problems makes the system an ideal one for use with remote computer stations.

RUSSIAN STENOTYPE USED IN MACHINE TRANSLATION

(Order Stock No. AD-629 692, Vol. I, Russian Stenotype Equipment: Systems Codes, Computer Systems, and Training, HC $3.00/MF $0.75;
AD-629 693, Vol. II, Russian Stenotype Equipment: Terminal Equipment and Input Multiplexing, HC $2.00/MF $0.50;
AD-629 694, Vol. III, Russian Stenotype Equipment: Training and Evaluation Machine, HC $2.00/MF $0.50;
AD-629 695, Vol. IV, Russian Stenotype Equipment: Instructor's Training Manual for Russian Stenotype, HC $3.00/MF $0.75.)

Russian stenotype encoding and transcription systems provide a rapid and economical method for converting textual and oral Russian language source

materials into machine readable form, according to the Itek Corporation. Stenotypists with no previous knowledge of Russian have learned rapidly (a few dozen hours of study and practice), achieving speeds of 60 words per minute. Itek has has devised a Russian steno keyboard and codes which are easy to learn and use, and which facilitate dictionary compilation. They minimize information loss, and demonstrate stenotyping speed potential which may exceed the 60 words per minute with further improvement of the codes. At the present time Itek has devised two Russian stenotype coding systems and several successful Russian stenotype to English translation systems.

Itek's report to the sponsoring Air Force Systems Command notes that mechanical translation from one language to another requires that the input language be converted to machine-readable form, that is, to a string of codes which the translating machine is able to compare to a similar string of codes in the memory which hold the dictionary. Ordinarily a paper-tape typewriter or key punch is used for the initial conversion process, but typing is time consuming and key punching even more so. Although the automatic recognition and conversion of printed characters would be highly desirable, satisfactory techniques have not yet been developed for all the fonts and states of type likely to be encountered.

Itek therefore sought an in between measure--the automatic conversion of machine shorthand or stenotype. Their complete study consists of four publications: Volume I covers the software aspects that describe the design of a Russian stenotype keyboard, coding systems for Russian stenotype, computer transcriptions system, dictionary compilation, and training procedures. Volume II covers the underlying concepts and description of remote-input terminal equipment developed for converting stenotype keyboard actuations into electrical signals suitable for transmission to a different location for subsequent translation type processing. Volume III describes equipment development concerned with automating certain aspects of the teaching of stenotype as a method for converting both textual and verbal Russian language source materials into machine readable form. Volume IV describes a teaching machine and the training procedures that would be employed.

Lubricants

SPACE AGENCY COMPILES LUBRICANT BIBLIOGRAPHIES

(Order Stock No. NASA-SP-5037 Bibliography on Solid Lubricants, HC $1.00/MF $0.50; and N65-29845 Lubrication, Corrosion and Wear, A Continuing Bibliography, HC $1.75/MF $1.00.)

The solid lubricant bibliography provides industry with summarized information on innovations contained in NASA and other space technology literature. It covers a diversity of topics, including lubrication with lamellar solids, lubrication under space/vacuum conditions, friction and wear characteristics of solid-lubricant films, and the effects of antiseizing compounds and lubricants on high-temperature alloys at elevated temperatures. The bibliography on lubrication, corrosion and wear contains annotated references on lubricating systems, bearing

design and performance, heat transfer and anticorrosion agents, friction and wear characteristics of materials, types of corrosion and techniques for corrosion prevention, and instrumentation and methods for testing lubricants.

Management Control, Decision Systems

MANAGERIAL DATA COMPILED FOR MULTI-PLANT COMPLEX

(Order Stock No. ALO-1--ALO Standard Structure for Managerial Data, HC $3.00/MF $0.75.)

The AEC's Albuquerque Operations Office (ALO) has published a report on ALO Standard Structure -- a framework for a broad management system covering many forms of managerial information for a multi-plant industrial complex. The complex, for ALO, is its weapons production system, but the author of the report believes "that the use of a simplified physical operating model of a complex industrial situation as the structural basis for a total business management and information system is a new approach, and that such an approach may be desirable in other comparable complex industrial situations." The ALO Standard Structure provides a framework for viewing to an appreciable depth, information on all resources, existing or planned, in both physical and financial terms, and in relation to work load. This is as opposed to a more limited view of resources, principally in financial terms, from the private industrial approach. The ALO Standard Structure covers information on operations, manpower, existing physical facilities, capacities, and plans and budgets for capital equipment and construction. It does this using one framework only. Furthermore, it uses this same framework to look at the work loads for a wide range of product and service lines so that their impact on resources can be seen directly.

Metals, Non-Ferrous and Alloys

BATTELLE SURVEYS METALWORKING OF BERYLLIUM AND REFRACTORIES

(Order Stock No. AD-630 427 Survey of Current Knowledge of the Deformation Characteristics of Beryllium, the Refractory Metals, and the Superalloys, HC $7.00/MF $1.50.)

Battelle Memorial Institute has prepared a survey of the present knowledge of deformation characteristics of beryllium, the refractory metals, and the superalloys. The work reviews the theory of plasticity and current high-velocity forming practices. Also covered are work-hardening mechanisms in metals, shear forming and spinning of metals, friction and wear in metal-deformation processes, rod-wire-tube drawing, and applications of static high pressure to the forming of metals--hydrostatic extrusion. The work is intended to be useful for both engineering students and production engineers since it treats the topics in such a way as to point out why specific variables must be modified to deform certain types of metals satisfactorily. When practical, data on the more-difficult-to-form metals are used to illustrate the principles, limitations, and effects of the processes.

THERMAL EXPANSION DATA TO 2500°C COMPILED ON REFRACTORIES

(Order Stock No. GEMP-375 Properties of Some Refractory Metals: Thermal Expansion Characteristics of Tungsten, Rhenium, Tantalum, Molybdenum, Niobium, W-25Re, Ta-10W, and Mo-50Re, HC $2.00/MF $0.50.)

General Electric has compiled linear thermal expansion data to 2500°C for W, Re, Ta, Mo, Nb, W-25Re, Ta-10W, and Mo-50Re. The data are important considerations in composite structures and cladding applications. In the case of Re, W-25Re, and Mo-50Re, the data are the first such measurements for these materials to high temperatures. GE metallurgists and physicists also developed an optical technique for measuring the expansion characteristics of refractories. A refraction error was identified which is inherent in optical measurements of thermal expansion for certain conditions.

Nuclear Technology

NEUTRON CAPTURE CROSS-SECTIONS OF RARE EARTH NUCLEI

(Order Stock No. LA-3463-MS Neutron Capture Cross Sections of Some Rare Earth Nuclei, HC $1.00/MF $0.50.)

Statistical theory has been used by Los Alamos Scientific Laboratory to calculate neutron capture cross sections of some rare earth nuclei for neutron energies of 1 and 10 keV. Particular attention was given to the isotopes of Eu. The investigators found that large capture cross sections of Eu^{151} and Eu^{153} arise from their large strength functions combined with small values of neutron width.

PHILLIPS REVIEWS PROGRESS IN REACTOR FUELS DEVELOPMENT

(Order Stock No. IDO-17154 Annual Progress Report on Reactor Fuels and Materials Development for FY 1965, HC $4.00/MF $1.00.)

Phillips Petroleum's Idaho Operations Office has published an annual report that reviews the progress in reactor fuels and materials development at the National Reactor Testing Station. The report covers Phillips' testing program for improved fuel materials for high flux and high power density reactors. Special goals include developments in the uranium intermetallic fuel systems, testing and evaluation of irradiation and temperature induced reaction in cermet fuels, and corrosion property studies of several aluminum-beryllium alloys. The report also reviews fatigue studies on pressure vessel steels, construction of an in-pile fatigue loop, ultrasonic and metallographic examinations of a Fiberglas-fueled, aluminum-clad MTR fuel element. It concludes with a summary of work in nondestructive testing, electron microscopy, fuel failure mechanisms, stress analysis, and prototypical irradiations.

Testing, Analysis

COMPUTER PROGRAM ROUTINELY ANALYZES PHOTO-PEAKS

(Order Stock No. AD-630 389--PPA, A Computer Program for Photo-Peak Analysis, HC $3.00/MF $0.75.)

A computer program for photo-peak analysis (PPA) developed by the Air Force is a simple FORTRAN computer code that makes practical the routine statistical analysis of photo-peaks obtained in day-to-day scintillation spectrometry. According to the Air Force, the program is flexible and relatively easy to use. It is efficient in computer run time, and produces answers that are useful to the experimenter working with pulse-height spectrometers. From the counting experience so far obtained with PPA, the program appears to be a practical tool for use in a number of studies involving radioisotopes as well as for use in analysis of more conventional statistical data. PPA fits experimental data with a Gaussian (Normal) distribution function, containing a linear bias term through the use of an iterative, least-squares technique. As many as five photo-peaks can be fitted by PPA in any given experimental spectrum with the following results: (1) the exact channel location of the photo-peak; (2) the width of the photo-peak (FWHM); (3) the peak count rate; (4) the integrated photo-peak count rate; and (5) the integrated photo-peak count rate corrected for radioactive decay to zero-time. The Air Force program report discusses the mathematics involved in the analysis, the input data required, the results of some experimental measurements, and some typical applications of the code. In addition, a complete FORTRAN listing with flow diagrams is appended.

KRYPTONATES DEVELOPED AS TRACERS

(Order Stock No. NYO-2757-5 Development of Krypton-85 as a Universal Tracer, HC $3.00/MF $0.75.)

Processes for the incorporation of krypton-85 into solids and the use of these sources as tracers in various scientific and engineering applications have been developed by Parametrics, Inc. These kryptonates show properties of great value in a broad spectrum of activities, such as surface temperature measurement, the study of metallurgical problems, chemical analyses and environment monitors, and kinetics and mechanism studies. The Parametrics program report says, "Krypton-85 has clearly become a universal tracer." Potential applications exist in such areas as friction and wear studies, metallurgical studies of stress-strain behavior, corrosion detection, beta-activated phosphors, beta sources, and radioisotope power sources. In the Parametrics study, homogeneous kryptonation, or uniform kryptonation in depth, was achieved by varying the kryptonation conditions. By noting the point of activity release on reheating a temperature-stabilized sample, researchers measured the maximum surface temperatures attained by various kryptonated solids. Another experiment tested a corrosive resistant coating (paint) by krypton-85 release from a kryptonated substrate (iron) under controlled environment.

PROCEEDINGS OF CONFERENCE ON WEIGHTS AND MEASURES PUBLISHED

(Order Stock No. Misc. Pub. 272--50th National Conference on Weights and Measures, HC $1.00/MF $1.25.)

The 1965 proceedings of the 50th National Conference on Weights and Measures have been published. Sponsored by the National Bureau of Standards and held in Washington, D. C., June 21-25, 1965, the conference was attended by officials from the various States, counties, and cities of the Nation, and by representatives from the U. S. Government, industry, and consumer organizations. The NBS publication contains the papers presented and the complete proceedings, including committee reports.

FATIGUE CRACKS OF PREDETERMINED SIZE MADE AUTOMATICALLY

(Order Stock No. AD-630 871 Starter Cracks for Fracture Toughness Testing by a Resonance Fatigue Technique, HC $1.00/MF $0.50.)

The Naval Research Laboratory has developed a technique that uses a reverse bending resonance machine for automatically introducing fatigue cracks of a predetermined size in specimens. The technique can be applied to mechanical testing in which specimens containing pre-existing flaws or cracks are required, such as fracture toughness testing and in studies of crack propagation. The NRL program report observes that in fracture toughness testing when starter cracks are introduced by a fatigue technique, it is usual for the specimen to be observed continuously while it is being fatigued so that the cyclic loading may be interrupted when the crack has reached the desired size. With the development of the resonance machine, NRL saw the possibility of obtaining cracks of the desired depth without the necessity of continuous operator attention. In the NRL machine, specimens are cycled at their resonant frequency in reversed bending. As a crack develops, the frequency drops and the test is automatically terminated by a preset cutoff mechanism when the frequency has changed by the desired amount. NRL finds that the beginning of the frequency change is a sensitive indication of the start of the propagation of a crack and is useful for controlling the size of it.

AIRCRAFT ALLOYS TESTED FOR FATIGUE CRACK PROPAGATION

(Order Stock No. AD-630 926 Fatigue Crack Propagation in Aircraft Materials, HC $3.00/MF $0.75.)

United Aircraft recently completed a study of the influence of metallurgical, chemical, and geometric variables on fatigue crack propagation (FCP) in alloys of aluminum, magnesium, steel, and titanium. For the materials tested, United indicates there was no appreciable thickness or chemical effect. Shot-peening did increase resistance to FCP, their program report adds. In general, there was an increase in the resistance to FCP in materials with greater ductility, and the correlation between FCP and static fracture toughness was very poor. United's report ranks all materials according to their resistance to FCP. It also gives the critical plane strain fracture toughness, critical plane stress fracture toughness, and ultimate tensile strength for all materials. Recommendations for further research include the determination of the effect of steady and vibratory stresses on FCP and the relationship between FCP and fracture toughness parameters.

CURRENT research & development PROJECTS

01. Aeronautics

GQF 420554 FIELD 20D

ION+EQUILIBRIUM FLOW IN SUPERSONIC AERODYNAMICS

P. WEGENER

AF-40-600-01133
/65- /

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GQF 420570 FIELD 20D,10B

JET BOUNDARY MIXING ZONE GROWTH RATE

R. C. BAUER, R. C. GERMAN

AF-40-600-01000
/65- /

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GSE 798 FIELD 20D

VA. INST. OF MARINE, ., VIRGINIA

AERODYNAMICS OF OSCILLATING AIRFOILS

G. D. CONE

NSF-GK-183
3/65- 3/66

NSF-ENGINEERING SCIENCES DIVISION

ZQF 475380 1 FIELD 1C, 1B

USAF, OAR, ARL, WRIGHT-PATT-CHEM RES, OHIO

METHODS FOR ESTIMATING FLYING QUALITIES

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A STATISTICAL ANALYSIS OF A TILT WING VTOL AIRCRAFT

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03. Astronomy and Astrophysics

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04. Atmospheric Sciences

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TIME VARIATION OF COSMIC RADIATION AT HIGH ALTITUDES IN THE POLAR REGIONS

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GQF 259765 2 FIELD 4A, 6B, 9+

C B S LABS STAMFORD, CONNECTICUT

DESIGN + DEVELOPMENT OF AN XRAY DETECTOR FOR STUDIES ON PHOTELECTRON EMISSION AT HIGH ALTITUDE
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GSP 2141 FIELD 8+, 9+, 9C, 8E

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MATHEMATICAL THEORY OF THE HISTORY OF THE EARTHS ATMOSPHERE

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L. C. MARSHALL

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COLORADO STATE UNIV, GRADUATE SCHOOL, ATMOSPHERIC SCIENCE, COLORADO

PHYSICAL AND STATISTICAL STUDY OF ROCKY MOUNTAIN OROGRAPHIC CLOUDS AND PRECIPITATION AND THEIR MODIFICATION

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SPECTROSCOPIC STUDIES OF ATOMIC STRUCTURE AND THE UPPER ATMOSPHERE

L. E. MACK, F. L. ROESLER

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STATE, WATER SURV UBNA, URBANA-WATER SURVEY DV, ILLINOIS

FEASIBILITY STUDY OF QUANTITATIVE RADAR MEASUREMENT OF PRECIPITATION ON LAKE MICHIGAN

J. A. CHANGNON, F. A. HUFF, G. E. STOUT

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IONOSPHERIC ABSORPTION AND EXOSPHERIC NOISE STUDIES

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FUNDAMENTAL STUDIES OF ATMOSPHERIC OZONE

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CYCLONE SCALE CIRCULATIONS

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TRANSPORT PROCESSES IN THE UPPER ATMOSPHERE

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THEORETICAL STUDIES OF ATOMIC AND MOLECULAR COLLISIONS ENERGY TRANSFER AND CHARGE EXCHANGE

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05. Behavioral and Social Sciences

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STUDY OF ORGANIZATIONAL PLANS FOR REGIONAL RESEARCH CONFERENCES

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NIL 182 FIELD 6B, 9C, 9+

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ELECTRONIC MUSIC
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L. A. HILLER, J. W. BEAUCHAMP
ILLINOIS, UNIVERSITY OF

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DEVELOPMENT OF AN AUTOMATED TEST ITEM FILE
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06. Biological and Medical Sciences

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UNIVERSITY OF MICHIGAN, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, MICHIGAN

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GRAFIX INC, NEW MEXICO

A GENERAL ADAPTIVE MOTOR LEARNING PROGRAM FOR A DIGITAL COMPUTER

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ZPE 1028 FIELD 12A, 5A,18A,20H

THE FLUX AND SPECTRUM OF FAST NEUTRONS IN NATURAL ENVIRONMENT

J. KASTNER, L. D. MARINELLI
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VISUAL SHAPE PERCEPTION TECHNIQUES

H. BLUM
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DEVELOPMENT OF A COMPUTER SYSTEM FOR STATISTICAL ANALYSIS DESIGNED ESPECIALLY FOR FAST RESPONSE DETAILED ANALYSIS OF BIOMEDICAL DATA

H. M. HUGHES
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07. Chemistry

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CORRELATION OF VAPOR PRESSURES OF PURE SUBSTANCES AND PHASE EQUILIBRIA OF BINARY SYSTEMS AT LOW TEMPERATURES

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THEORY OF MOLECULAR EXCITONS

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NEW HYDRIDES OF TRANSITION METALS

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CHEMICAL REACTIONS OF SECONDARY ELECTRONS

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ATLANTIC RESEARCH CORP, VIRGINIA

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MILD FLUORINATION OF NITROGEN COMPOUNDS

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REACTIONS OF METALLIC IONS

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PRESSURE DEPENDENCE OF ELECTROLYTIC CONDUCTANCE

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GQF 3760 1 FIELD 7A, 7D,20J, 7B

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KINETICS OF ATOMIC ASSOCIATION REACTIONS USING FLASH PHOTOLYSIS

G. BURNS

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QUANTITATIVE CONFORMATIONAL ANALYSIS

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FULMER RESEARCH INST, UNITED KINGDOM

HEATS OF FORMATION OF MIXED-METAL OXIDES

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DECOMPOSITION KINETICS OF AMMONIUM PERCHLORATE

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EVAPORATION AND CONDENSATION OF LIQUIDS IN GASES FOR NON-CONTINUUM REGIMES

J. R. BROCK

NSF-GK-381
5/65- 5/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 796 FIELD 7D,20M,20L,20D

SYRACUSE UNIVERSITY, SCHOOL OF ENGINEERING, CHEMICAL & METAL ENGIN, NEW YORK

GAS-PARTICLE HEAT TRANSFER COEFFICIENTS IN PACKED BEDS

M. LITTMAN
NSF-GK-174
3/65- 3/66

NSF-ENGINEERING SCIENCES DIVISION

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MASS INST OF TECHNOL, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, MASSACHUSETTS

MICROWAVE INDUCED CHEMICAL REACTIONS

A. F. BADDOUR

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NSF-ENGINEERING SCIENCES DIVISION

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NORTHWESTERN UNIV, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, ILLINOIS

A STUDY OF PHOTOCHEMICAL REACTORS

J. S. DRANOFF

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6/65- 6/66

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LASER ACTION TO PROMOTE CHEMICAL REACTIONS

J. H. WEBER, L. C. LAO
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OHIO STATE UNIVERSITY, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, OHIO

CRITICAL PROPERTIES OF HYDROCARBON MIXTURES

W. B. KAY

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7/65- 7/66

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MOLECULAR AND TURBULENT DIFFUSION

J. A. SLEICHER

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POLYTECH INST BROOKLYN, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, NEW YORK

THE ANALYSIS OF STARTUP AND SHUTDOWN OF PROCESSES

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MASS AND ENERGY EXCHANGE BETWEEN SURFACES AND GASES IN TURBULENT FLOW

A. YERAZUNIS

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GSE 845 FIELD 7A, 7D

UNIV OF TEXAS, AUSTIN, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, TEXAS

THE SOLUBILITIES AND DISTRIBUTION OF GASES IN PETROLEUM HYDROCARBON MIXTURES

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COLORADO SCH OF MINES, SCHOOL OF ENGINEERING, METALLURGICAL ENGIN, COLORADO

EFFECT OF GROUP IB ELEMENTS ON THE THERMODYNAMIC ACTIVITY OF SULFUR IN LEAD

A. M. LARSON

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GSP 2098 FIELD 7D, 8G, 8H

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REMOVAL OF ALKALINITY FROM SEA WATER BY CLAY MINERALS

K. S. DEFFEYES

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STRUCTURE AND BONDING IN SOME COORDINATION COMPOUNDS

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4/65- 4/66

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GSP 2195 FIELD 7D

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APPLICATION OF NUCLEAR MAGNETIC RESONANCE TECHNIQUES IN ANALYTICAL CHEMISTRY

R. J. KULA

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GSP 2234 FIELD 7C

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PHOSPHONIUM SALTS AND PHOSPHINEMETHYLENES

H. O. GRIM

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POLYMERIZATION OF MONOLAYERS ADSORBED ON SODIUM MONTMORILLONITE

A. BLUMSTEIN

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HIGHLY STRAINED HYDROCARBONS

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ATTACK OF OZONE ON NUCLEOPHILIC CENTERS IN ORGANIC MOLECULES

P. S. BAILEY

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GUE 153 FIELD 8H,12A, 5C, 8E

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OPTIMAL DESALINATION BY GEOMETRIC PROGRAMMING AND MATHEMATICAL DECOMPOSITION

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INTERIOR-OFFICE OF SALINE WATER

GYE 310359 FIELD 7C, 7D, 7B

CORNELL UNIVERSITY, AGRICULTURAL EXPT STA, CLOTHING + TEXTILES, NEW YORK

THE LOCATION AND DISTRIBUTION OF METHYLENE CROSS-LINKS IN FORMALDEHYDE-TREATED CELLULOSE

B. SMITH

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7/64- 6/65

AGRICULTURE-DEPT OF AGRICULTURE

PRW 72 1 FIELD 20M,20J,20L, 7B

TEXAS A + M UNIVERSITY, GRADUATE SCHOOL, PHYSICS, TEXAS

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HIGH RESOLUTION MASS SPECTROSCOPY AND GAS CHROMATOGRAPHY

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WELCH, ROBERT A FOUNDATION-TEXAS

PRW 89 1 FIELD 7D,20J, 7B

MICROWAVE SPECTROSCOPY

L. C. SAMS

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5/65- 4/66

WELCH, ROBERT A FOUNDATION-TEXAS

ZBA 1797 FIELD 20J, 5A,20L, 7B

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SENSITIZED FLUORESCENCE OF CALCIUM FLUORIDE - CESIUM, MANGANESE UNDER HIGH INTENSITY UV IRRADIATION

A. DANIELSON

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COMMERCE-NATIONAL BUREAU OF STANDARDS

ZPE 1002 FIELD 7C, 7D,20J, 5A

MECHANISM OF THE LUMINESCENCE PROCESS IN ORGANIC SOLUTIONS

I. B. BERLMAN
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ZPE 1086 FIELD 7C, 7D,20M,20J

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FLAVONES AS FLUORIMETRIC AND COLORIMETRIC REAGENTS FOR TRACE METAL DETERMINATIONS

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AEC-BIOLOGY + MEDICINE

ZPE 1320 FIELD 7D,18A

RADIOCHEMICAL AND INSTRUMENTAL METHODS IN RADIOACTIVATION ANALYSIS

G. C. COTZIAS, D. C. BORG, W. J. MARTIN
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ELECTROCHEMISTRY

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USAF, AFSC, RTD, WRIGHT-PATT-AF MAT LAB, OHIO

ELECTONIC PROPERTIES OF AROMATIC COMPOUNDS

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ZQF 284798 1 FIELD 7A, 7D, 7B

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CONDUCTIVITY OF FUSED SALTS

L. A. KING
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DOD-AIR FORCE

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USAF, AF ACADEMY, ACADEMY, COLORADO

CARBON DIOXIDE FORMATION CELL

L. A. KING
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APPRACHES TO SYNTHESIS + REACTIONS OF TRIPHENYLETHYNYLPHOSPHONIUM BROMIDE

C. J. CHEER
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PHOTOLYSIS OF ORGANIC FLUORINE COMPOUNDS

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08. Earth Sciences and Oceanography

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STUDY OF THE EARTHQUAKE PHASE PKP AT A DISTANCE OF 142 DEGREES FROM THE SOURCE

D. H. SHURBET

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STUDY OF THE PHYSICAL PROPERTIES OF ROCK WHICH AFFECT ITS RESPONSE TO DYNAMIC LOADS

J. H. OSHIER

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DOD-AIR FORCE

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YALE UNIVERSITY, GRADUATE SCHOOL, BIOLOGY, CONNECTICUT

STUDIES IN PALEOLIMNOLOGY

G. S. DEEVEY, M. TSUKADA

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6/64- 6/65

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GSP 2179 FIELD 8D, 8G, 7B

COLUMBIA UNIVERSITY, GRADUATE SCHOOL, GEOLOGY, NEW YORK

ISOTOPIC COMPOSITION OF LEAD AND STRONTIUM IN VOLCANIC ROCKS

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APPLICATION OF ELECTRONIC ANALOG DEVICE TO SOLUTION OF HYDROLOGIC AND RIVER-BASIN-PLANNING PROBLEMS

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GVL 166 FIELD 8G,11B

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, ILLINOIS

ROCKWELL HARDNESS AS AN INDEX PROPERTY OF ROCKS

D. U. DEERE, D. W. DEERE, P. KRAATZ
/65- /

ILLINOIS, UNIVERSITY OF

ZPE 1355 FIELD 13B, 8F, 8H

AERIAL SURVEY OPERATIONAL PROCEDURES

E. J. STORY, A. S. TRUNDLE
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EXPLORATORY STUDIES IN GEODESY AND GRAVITY

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FEASIBILITY TESTS OF GEODETIC TECHNIQUES

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ZQF 260088 FIELD 20M, 8F, 8G,15G

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ALBEDO MEASUREMENTS
/65- /

R. B. TOOLIN
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PROPAGATION OF SEISMIC WAVES

N. A. HASKELL
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DOD-AIR FORCE

ZQF 260100 FIELD 8K

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

PROPERTIES OF EARTH NOISE FIELDS

F. A. CROWLEY
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DOD-AIR FORCE

ZQF 260102 FIELD 8K, 8+,15+, 9+

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

SEISMIC DETECTION AND IDENTIFICATION

R. A. GRAY
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DOD-AIR FORCE

ZQF 260103 FIELD 8K,19+

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

SEISMIC COMPENSATION TECHNIQUES

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DOD-AIR FORCE

ZQF 260137 FIELD 4A, 8+, 9+,12A

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

GEOMAGNETIC ACTIVITY

E. J. CHERNOSKY
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ZQF 260170 FIELD 22D, 8F, 8N, 8K

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS
CRUSTAL PROPERTIES AND DYNAMICS
G. H. CABINISS
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ZQF 550215 FIELD 8K,15C

USAF, AFSC, KIRTLAND AFB, NEW MEXICO
GAS BAG PHASE 3 FREE FIELD GROUND MOTION STUDY
C. J. HIGGINS
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DOD-AIR FORCE

ZQF 550218 FIELD 8F, 8G

USAF, AFSC, KIRTLAND AFB, NEW MEXICO
THE ORIGIN AND FORMING PROCESSES OF CRATERS /65- /
J. M. SUN
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USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA
MECHANICS OF SNOW TRANSPORT AND DEPOSITION
N. S. STEHLE, E. H. MOSER /65- /
DOD-NAVY

09. Electronics and Electrical Engineering

GQF 3971 FIELD 12A, 5C

UNIV OF CAL-BERKELEY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, CALIFORNIA

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MASS INST OF TECHNOL, GRADUATE SCHOOL, MASSACHUSETTS

CONDUCT THEORETICAL + EXPERIMENTAL RESEARCH ON PLASMA COATED ANTENNAS IN A WIND TUNNEL

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ADAPTIVE BANG-BANG CONTROL OF AN UNSTABLE MECHANICAL SYSTEM

J. F. SCHAEFER
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METHODOLOGY OF DYNAMIC DATA PROCESSING

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PROBE DATA PROCESSING

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COMPUTER SUPPORT

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AUTO-CORRELATION DATA REDUCTION SYSTEM

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DESIGN AND APPLICATION OF A FAST RESPONSE PRESSURE TRANSDUCER USING A CAPACITANCE PRINCIPLE

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AUTOMATIC ANALYSIS OF AUTOANALYZER OUTPUT

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MEAN + SQUARE ANALYSIS OF FEEDBACK CONTROL SYSTEMS

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10. Energy Conversion (Non-propulsive)

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11. Materials

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CHANGES IN PHYSICAL PROPERTIES OF ASPHALT

- NONE

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CREEP MECHANISMS IN ALLOY CRYSTALS

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PHYSICAL-CHEMICAL NATURE OF THE MATRIX REINFORCEMENT INTERFACE

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CAMBRIDGE UNIVERSITY, UNITED KINGDOM

FRICTION AND WEAR OF SOLIDS AT VERY LOW TEMPERATURES

F. P. BOWDEN
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UNIV OF THE SAARLANDES, GERMANY

BEHAVIOR OF BRITTLE MATERIALS AT VARIOUS RANGES OF TEMPERATURES

U. WEGNER
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MATHEMATICAL DESCRIPTION OF THE MECHANICAL BEHAVIOR OF WOOD

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FUNDAMENTAL STUDY OF PROPERTIES OF REFRACTORIES AS RELATED TO SERVICE IN A STEEL PRESSURE CASTING PROCESS

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D. R. LANKARD
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INTERFACIAL REACTIONS OCCURRING BETWEEN METAL AND CERAMIC MOLDS USED FOR A PRECISION CASTING PROCESS

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CATERPILLAR TRACTOR COMPANY

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SCALING OF CONCRETE PAVEMENTS

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A CORRELATION OF SHRINKAGEAND CRACKING IN CONCRETE

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MODIFIED METHOD FOR DETERMINING CHEMICAL RESISTANCE OF GLASS

F. V. TOOLEY, P. J. MARCHIANDO

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/65- /

NATIONAL LIME ASSOCIATION

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CORROSION PROTECTION AFFORDED BY SOLID FILM LUBRICANTS

F. MEADE
/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

ZQA 12 FIELD 11H,11F,13H,11G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

EFFECTS OF ADDITIVES UPON BEARING METAL FATIGUE

W. FISHER
/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

ZUG 552 FIELD 7D, 7C,13H

USDI, BUR MINES, S.L.C., UTAH

RADIOACTIVE CHEMISTRY IN EXTRACTIVE METALLURGY

C. H. CLEMMONS, H. L. GIBBS, A. M. POSTON
C. H. SCHACK

INT-BM-4160-14
/65- /

INTERIOR-BUREAU OF MINES

ZUG 665 FIELD 7A, 7D,11F, 7B

USDI, BUR MINES, BOULDER CITY, NEVADA

ELECTROMETALLURGY OF COLUMBIUM

W. M. WONG, D. E. KIRBY

INT-BM-4158-11-4
/65- /

INTERIOR-BUREAU OF MINES

ZUG 667 FIELD 7A, 7D,11F,13H

USDI, BUR MINES, BOULDER CITY, NEVADA

ELECTROMETALLURGY OF HAFNIUM

W. M. WONG, G. M. MARTINEZ

INT-BM-4158-11-2
/65- /

INTERIOR-BUREAU OF MINES

ZUG 668 FIELD 7C, 7A, 7D,11F

USDI, BUR MINES, BOULDER CITY, NEVADA

ELECTROMETALLURGY OF YTTRIUM

W. M. WONG, C. C. MERRILL

INT-BM-4158-11-1
/65- /

INTERIOR-BUREAU OF MINES

12. Mathematical Sciences

GQF 1122 8 FIELD 12A

UNIVERSITY OF MICHIGAN, GRADUATE SCHOOL, MATHEMATICS, MICHIGAN

TOPOLOGY AND MODERN ALGEBRA

R. L. WILDER

AF-AFOSR-0373-63
/65- /

DOD-AIR FORCE

GQF 3105 3 FIELD 12A

UNIVERSITY OF MISSOURI, GRADUATE SCHOOL, MATHEMATICS, MISSOURI

NONLINEAR PARTIAL DIFFERENTIAL EQUATIONS

M. D. GEORGE

AF-AFOSR-0756-65
/65- /

DOD-AIR FORCE

GQF 3548 2 FIELD 9+

UNIV OF CAL-BERKELEY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, CALIFORNIA

PROGRAM OF SYSTEMS RESEARCH

A. R. BERGEN

AF-AFOSR-0230-64
/65- /

DOD-AIR FORCE

GQF 3682 FIELD 12A

NEW MEX STATE UNIV, GRADUATE SCHOOL, MATHEMATICS, NEW MEXICO

COMPACT LINEAR OPERATORS

E. O. THORP

AF-AFOSR-0457-63
/65- /

DOD-AIR FORCE

GQF 3743 1 FIELD 9+,12A, 9D, 9C

NEW YORK UNIVERSITY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, NEW YORK

RESEARCH INVESTIGATIONS IN SYSTEMS THEORY

J. K. WOLF

AF-AFOSR-0499-65
/65- /

DOD-AIR FORCE

GQF 3820 FIELD 12A, 9D

UNIV OF CAL-SANTA BARB, GRADUATE SCHOOL, MATHEMATICS, CALIFORNIA

GENERALIZED MATRIX FUNCTIONS

M. MARCUS

AF-AFOSR-0698-65
/65- /

DOD-AIR FORCE

GQF 3852 FIELD 12A

WASHINGTON UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, MISSOURI

THEORY OF TOEPLITZ FORMS

I. I. HIRSCHMAN

AF-AFOSR-0721-65
/65- /

DOD-AIR FORCE

GQF 3942 FIELD 12A

UNIVERSITY OF CHICAGO, GRADUATE SCHOOL, MATHEMATICS, ILLINOIS

RESEARCH IN ANALYSIS

A. ZYGMUND

AF-AFOSR-0736-65
/65- /

DOD-AIR FORCE

GQF 3975 FIELD 12A

UNIV OF WASHINGTON, GRADUATE SCHOOL, MATHEMATICS, WASHINGTON

TOPICS IN POTENTIAL THEORY

M. G. ARSOVE

AF-AFOSR-0936-65
/65- /

DOD-AIR FORCE

GQF 3979 FIELD 12A

UNIVERSITY OF MISSOURI, GRADUATE SCHOOL, STATISTICS, MISSOURI

CONVERGENCE RATES FOR WEIGHTED SUMS OF RANDOM VARIABLES

H. D. BRUNK

AF-AFOSR-0746-65
/65- /

DOD-AIR FORCE

GQF 3991 FIELD 12A

TULANE UNIV OF LA, GRADUATE SCHOOL, MATHEMATICS, LOUISIANA

QUASI-CONFORMAL MAPPINGS AND THEIR MODULI

G. S. YOUNG

AF-AFOSR-0773-65
/65- /

DOD-AIR FORCE

GQF 4318 FIELD 12A

YALE UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, CONNECTICUT

ORDINARY DIFFERENTIAL EQUATIONS

E. HILLE

AF-AFOSR-0776-65
/65- /

DOD-AIR FORCE

GQF 4368 FIELD 12A

UNIVERSITY OF PISA, ITALY

RESEARCH IN COMPLEX ANALYSIS

A. ANDREOTTI

AF-EOAR-0042-65
/65- /

DOD-AIR FORCE

GQF 4461 FIELD 12A

RICE UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, TEXAS

ANALYSIS FUNCTIONAL ANALYSIS AND RELATED TOPICS

G. JOHNSON

AF-AFOSR-0941-65
/65- /

DOD-AIR FORCE

GQF 4462 FIELD 12A

UNIV OF CAL-BERKELEY, GRADUATE SCHOOL, STATISTICS, CALIFORNIA

FIFTH BERKELEY SYMPOSIUM ON MATHEMATICAL STATISTCS AND PROBABILITY

L. LECAM

AF-AFOSR-0912-65
/65- /

DOD-AIR FORCE

GQF 207020 2 FIELD 12A

USDC, NATL BUR STAN, DIST OF COLUMBIA

RESEARCH ON BOUNDS FOR EIGENVALUES + EIGENVECTORS OF SELF ADJOINT OPERATORS

W. BAZLEY

DD-33-657-62354
/65- /

DOD-AIR FORCE

GQF 207030 5 FIELD 7D,12A

MIDWEST RES INST KAN, MISSOURI

RESEARCH IN NUMERICAL ANALYSIS

Y. L. LUKE

AF-33-615-02764
/65- /

DOD-AIR FORCE

GQF 207034 2 FIELD 12A

PURDUE UNIVERSITY, GRADUATE SCHOOL, STATISTICS, INDIANA

MULTIPLE DECISION PROCEDURES AND MULTIVARIATE DISTRIBUTION THEORY

S. S. GUPTA

AF-33-657-11737
/65- /

DOD-AIR FORCE

GQF 207384 4 FIELD 12A

EFFECTIVENESS OF TRANSFORMATIONS USED MATH + APPLIED STATISTICS

M. C. SEVERO

AF-33-657-09885
/65- /

DOD-AIR FORCE

GQF 207440 FIELD 12A

NORTH AMER AVIATION, CANOGA PARK, CALIFORNIA

RESEARCH ON EXPERIMENTAL DESIGN AND ESTIMATION THEORY

S. R. WEBB

AF-33-615-02818
/65- /

DOD-AIR FORCE

GQF 207536 FIELD 12A

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

REDUCTION OF TWO POINT BOUNDARY VALUE PROBLEMS TO INITIAL VALUE PROBLEMS BY PROJECTION IN FUNCTION SPACES

K. GUDERLEY
/65- /

DOD-AIR FORCE

GQF 259064 4 FIELD 9+, 9A,12A,

EMMANUEL COLLEGE, UNDERGRADUATE SCHOOL, MASSACHUSETTS

MATHEMATICAL ANALYSIS CALCULATION + DATA REDUCTION OF INHOUSE EXPERIMENTAL DATA + FORMULAE

M. P. HAGAN

AF-19-604-08471
/65- /

DOD-AIR FORCE

GQF 284863 FIELD 9+,12A, 9D

SYRACUSE UNIVERSITY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, NEW YORK

FUNCTIONAL ANALYSES AND NON-LINEAR SYSTEMS

F. BICKART

AF-30-602-03538
/65- /

DOD-AIR FORCE

GSP 2273 FIELD 12A

STATE UNIV N Y STONY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

TEICHMULLER SPACES

L. KRAVETZ

NSF-GP-4327
4/65- 4/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2284 FIELD 12A

UNIVERSITY OF MICHIGAN, GRADUATE SCHOOL, MATHEMATICS, MICHIGAN

COMPLEX VARIABLES AND FUNCTIONAL ANALYSIS

M. O. READE, J. M. ANDERSON, D. DICKSON
R. L. DUREN, F. W. GEHRING, J. KRZYZ
A. L. SHIELDS

NSF-GP-4153
2/65- 2/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2289 FIELD 12A

UNIVERSITY OF MICHIGAN, GRADUATE SCHOOL, MATHEMATICS, MICHIGAN

TOPOLOGY AND DIFFERENTIAL GEOMETRY

E. HALPERN, M. BROWN, N. J. HICKS

J. M. KISTER, R. C. ONEILL, R. H. ROSEN

NSF-GP-4151
2/65- 2/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2291 FIELD 12A

STANFORD UNIVERSITY, GRADUATE SCHOOL,
MATHEMATICS, CALIFORNIA

ANALYTIC STRUCTURES

H. L. ROYDEN, S. B. AGARD, B. CENKL
K. KODAIRA, D. C. SPENCER

NSF-GP-4172
5/65- 5/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2292 FIELD 12A

UNIVERSITY OF MICHIGAN, GRADUATE SCHOOL,
MATHEMATICS, MICHIGAN

ALGEBRA AND LOGIC

R. C. LYNDON, J. H. BENNETT, J. A. COHN
D. G. HIGMAN, E. F. KRAUSE, D. LIVINGSTON
J. L. MCLAUGHLIN

NSF-GP-4147
2/65- 2/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2293 FIELD 12A

CARNEGIE INST TECHNOL, GRADUATE SCHOOL,
MATHEMATICS, PENNSYLVANIA

FINITE LINEAR GROUPS

H. S. LEONARD

NSF-GP-4240
7/65- 7/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2294 FIELD 12A

OHIO STATE UNIVERSITY, GRADUATE SCHOOL,
MATHEMATICS, OHIO

NONLINEAR TRANSFORMATIONS

A. D. DIXON

NSF-GP-4218
7/65- 7/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2295 FIELD 12A

STANFORD UNIVERSITY, GRADUATE SCHOOL,
MATHEMATICS, CALIFORNIA

TIME SERIES ANALYSIS

E. PARZEN, U. GRENANDER, J. HAJEK
P. WHITTLE

NSF-GP-4265
4/65- 4/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2313 FIELD 12A

OHIO STATE UNIVERSITY, GRADUATE SCHOOL,
MATHEMATICS, OHIO

ALGEBRA, ARITHMETICS AND THE GEOMETRY OF
NUMBERS
H. J. ZASSENHAUS

NSF-GP-4243
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2324 FIELD 12A

RUTGERS THE STATE UNIV, GRADUATE SCHOOL,
MATHEMATICS, NEW JERSEY

FUNCTIONAL ANALYSIS

J. ELLIOTT, M. GROSSMANN, S. LEADER
L. MEEKER

NSF-GP-4413
4/65- 4/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2325 FIELD 12A

DUKE UNIVERSITY, GRADUATE SCHOOL,
MATHEMATICS, NORTH CAROLINA

FUNCTIONAL ANALYSIS

S. L. WARNER, R. T. HARRIS
L. A. HINRICHS, R. A. SCOVILLE
D. P. STACKELBERG

NSF-GP-4473
7/65- 7/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2326 FIELD 12A

TOPOLOGY AND GEOMETRY

R. BOTT, H. GLUCK, B. MAZUR, S. STERNBERG

NSF-GP-4433
6/65- 9/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2327 FIELD 12A, 9D, 5A

UNIV OF CAL-L. A., GRADUATE SCHOOL,
PHYSICS, CALIFORNIA

ON-LINE PROBLEM SOLVING TECHNIQUES

J. D. FRIED

NSF-GP-4454
5/65- 5/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2333 FIELD 12A

DIFFERENTIAL EQUATIONS IN A BANACH SPACE

C. W. REED

NSF-GP-4469
6/65-12/65

NSF-PHYSICAL SCIENCES DIVISION

GSP 2334 FIELD 12A

YESHIVA UNIVERSITY, GRADUATE SCHOOL,
MATHEMATICS, NEW YORK

OVERDETERMINED SYSTEMS OF PARTIAL
DIFFERENTIAL EQUATIONS

L. FLATTO

NSF-GP-4444
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2335 FIELD 12A

MODULES AND RINGS WITH MAXIMUM CONDITION

E. H. FELLER

NSF-GP-4453
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2349 FIELD 12A

UNIV OF CAL-BERKELEY, GRADUATE SCHOOL,
MATHEMATICS, CALIFORNIA

METAMATHEMATICS, SET THEORY, AND
FOUNDATIONS OF GEOMETRY

A. TARSKI, L. HENKIN

NSF-GP-4608
7/65- 7/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2350 FIELD 12A

UNIVERSITY OF ILLINOIS, GRADUATE SCHOOL,
MATHEMATICS, ILLINOIS

LOGIC AND GROUP THEORY

W. W. BOONE, T. G. MCLAUGHLIN
D. E. MULLER, J. J. ROTMAN, G. TAKEUTI
P. M. WEICHSEL

NSF-GP-4616
6/65- 8/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2351 FIELD 12A

UNIV OF PENNSYLVANIA, GRADUATE SCHOOL,
MATHEMATICS, PENNSYLVANIA

DIFFERENTIAL STRUCTURES

A. NIJENHUIS

NSF-GP-4503
7/65- 7/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2352 FIELD 12A

UNIVERSITY OF ARIZONA, GRADUATE SCHOOL,
MATHEMATICS, ARIZONA

FUNCTIONAL EQUATIONS AND RELATED
ALGEBRAIC SYSTEMS

A. SCHWEIZER

NSF-GP-4522
5/65- 5/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2353 FIELD 12A

UNIV OF CONNECTICUT, GRADUATE SCHOOL,
MATHEMATICS, CONNECTICUT

CARDINAL SERIES AND RELATED TOPICS

R. P. GOSSELIN

NSF-GP-4580
7/65- 7/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2354 FIELD 12A

UNIVERSITY OF GEORGIA, GRADUATE SCHOOL,
MATHEMATICS, GEORGIA

LOCALLY COMPACT TOPOLOGICAL SEMIGROUPS

J. G. HORNE

NSF-GP-4585
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2355 FIELD 12A

WESTERN RESERVE UNIV, GRADUATE SCHOOL,
MATHEMATICS, OHIO

PROBLEMS IN FIBER SPACES

G. D. ALLAUD, M. FUCHS, G. M. ROSENSTEIN

NSF-GP-4582
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2356 FIELD 12A

GEORGETOWN UNIVERSITY, GRADUATE SCHOOL,
MATHEMATICS, DIST OF COLUMBIA

PARTIAL DIFFERENTIAL EQUATIONS

A. K. AZIZ, J. E. LAGNESE

NSF-GP-4493
7/65- 7/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2376 FIELD 12A

STRUCTURE OF RECURSIVELY ENUMERABLE SETS

P. R. YOUNG

NSF-GP-4596
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2379 FIELD 12A

STRICT TOPOLOGY AND MULTIPLIER PROBLEMS

J. WELLS

NSF-GP-4584
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2383 FIELD 12A

UNIV OF MINNESOTA, GRADUATE SCHOOL, MATHEMATICS, MINNESOTA

HARMONIC ANALYSIS ON GROUPS WITH APPLICATIONS TO DIRICHLET SERIES

S. A. GAAL

NSF-GP-4495
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2400 FIELD 12A

BROWN UNIVERSITY, GRADUATE SCHOOL, APPLIED MATHEMATICS, RHODE ISLAND

NONLINEAR DYNAMICAL SYSTEMS

J. P. LASALLE, J. K. HALE, S. LEFSCHETZ

NSF-GP-4632
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2401 FIELD 12A

ADELPHI UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

NUMERICAL ANALYSIS

M. L. BUCHANAN, H. C. KRANZER

NSF-GP-4573
7/65- 7/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2405 FIELD 12A

WAYNE STATE UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, MICHIGAN

FUNCTIONAL ANALYSIS

I. NAKANO

NSF-GP-4499
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2406 FIELD 12A

PENNSYLVANIA ST UNIV, GRADUATE SCHOOL, MATHEMATICS, PENNSYLVANIA

DIRICHLETS L-SERIES AND RELATED TOPICS

S. CHOWLA

NSF-GP-4305
4/65- 4/66

NSF-PHYSICAL SCIENCES DIVISION

ZQF 260028 FIELD 9+,12A, 5C, 9C

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

THEORY OF COMBINATORIAL AND SEQUENTIAL NETS

R. H. URBANO
/65- /

DOD-AIR FORCE

ZQF 260081 FIELD 4A,12A, 8E

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

NUMERICAL ANALYSIS

P. F. FOUGERE
/65- /

DOD-AIR FORCE

ZQF 260135 FIELD 4A,12A, 8E

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

SPHERICAL HARMONIC ANALYSIS

P. F. FOUGERE
/65- /

DOD-AIR FORCE

ZQF 284805 1 FIELD 12A, 5C

USAF, AF ACADEMY, ACADEMY, COLORADO

COMPARISON OF THE METHODS OF DYNAMIC PROGRAMMING AND STEEPEST DESCENT FOR OPTIMIZATION PROBLEMS

J. E. FUNK
/65- /

DOD-AIR FORCE

ZQF 284810 2 FIELD 12A,13M,20D

USAF, AF ACADEMY, ACADEMY, COLORADO

NUMERICAL SOLUTION OF A STEFAN PROBLEM INVOLVING TWO SPACE DIMENSIONS WITH RADIAL SYMMETRY

W. D. MARSLAND
/65- /

DOD-AIR FORCE

ZQF 284811 1 FIELD 12A

USAF, AF ACADEMY, ACADEMY, COLORADO

TOPOLOGICAL PROBLEMS IN THREE DIMENSIONAL EUCLIDEAN SPACE

W. R. ALFORD

/65- /

DOD-AIR FORCE

ZQF 382416 2 FIELD 12A

USAF, AFSC, AMD, BROOKS AFB, S-64, TEXAS

EFFECTIVENESS OF CERTAIN NON PARAMETRIC TESTS

P. NONE

/65- /

DOD-AIR FORCE

ZON 544141 2 FIELD 12A

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

APPLIED MATHEMATICS

A. WILCOXSON

/65- /

DOD-NAVY

13. Mechanical, Industrial, Civil, and Marine Engineering

7GX 636 6 1 FIELD 13A, 7C, 7D, 7B

UNIV OF CAL-RIVERSIDE, GRADUATE SCHOOL, CHEMISTRY, CALIFORNIA

MECHANISMS OF PHOTOCHEMICAL REACTIONS IN URBAN AIR

J. N. PITTS, E. HEINE, H. W. JOHNSON
W. MORGANROTH, J. VERNON, J. WAN

7-AP-00109-06
12/64-11/65

PHS-BSS

7GX 862 2 2 FIELD 13A,20F, 7B

UNIV OF PITTSBURGH, SCHOOL OF PUBLIC HLTH, PUBLIC HEALTH ADMIN, PENNSYLVANIA

LIGHT TRANSMISSION AND SCATTERING PROPERTIES OF DUSTFALL AND SMOKE

M. CORN

7-AP-00302-02
7/65-10/65

PHS-BSS

7GX 1196 2 FIELD 13B, 6B

NEW MEX STATE UNIV, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, NEW MEXICO

CONTINUOUS MONITORING OF SOME ORGANIC WASTES

J. W. CLARK, W. J. OBRIEN

7-WP-00631-02
9/65- 8/66

PHS-BSS

7GX 1378 2 FIELD 13A, 7C, 7D, 7B

UNIVERSITY OF COLORADO, GRADUATE SCHOOL, CHEMISTRY, COLORADO

TRACER STUDIES IN AIR POLLUTION - I S ULFUR DIOXIDE

P. URONE

7-AP-00357-02
10/65- 9/66

PHS-BSS

7GX 1490 2 FIELD 13A, 7C,21B,21D

UNIVERSITY OF MICHIGAN, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, MICHIGAN

RELATION OF WALL QUENCHING OF FLAMES TO AIR POLLUTION

W. MIRSKY, P. D. CHAN, D. H. LANE
B. I. STONE

7-AP-00366-02
9/65- 8/66

PHS-BSS

7GX 3086 1 FIELD 13B, 5A

PURDUE UNIVERSITY, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, INDIANA

PARTICIPATION OF FOREIGN ENGINEERS AND SCIENTISTS IN THE PURDUE INDUSTRIAL WASTE CONFERENCE

D. E. BLOODGOOD, J. E. ETZEL
E. J. KIRSCH

7-WP-00861-01
1/66-12/66

PHS-BSS

GSE 767 FIELD 12A, 5C,13M

DIGITAL COMPUTER CONTROLLED PRODUCTION MODELS

O. D. BEDWORTH

NSF-GK-337
4/65- 4/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 802 FIELD 8H,20D

COLORADO STATE UNIV, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, COLORADO

INTERACTION BETWEEN WIND AND OPEN CHANNEL FLOW

E. J. PLATE

NSF-GK-188
3/65- 3/66

NSF-ENGINEERING SCIENCES DIVISION

GUW 374 FIELD 13B

UNIV OF WISCONSIN, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, WISCONSIN

AN INVESTIGATION OF THE RELATIONSHIP BETWEEN THE FILTERING PROPERTIES OF PARTICULATES IN WATER AND THE FILTER MEDIUM

L. B. POLKOWSKI, R. LOFY

INT-WR-A-006-WIS
/66- /

INTERIOR-OFFICE OF WATER RESOURCES

JNS 1 FIELD 11C,11F,13H,11G

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, ILLINOIS

N-A-XTRA JOINTS

J. E. STALLMEYER, W. M. DERBY
R. C. DOLMETSCH, W. H. MUNSE
/65- /

NATIONAL STEEL CORPORATION

JOC 2 FIELD 11B

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CERAMIC ENGINEERING, ILLINOIS

IMPROVED METHOD FOR INVEST

F. V. TOOLEY, D. E. WILLETTS
/65- /

OWENS-CORNING FIBERGLASS CORPORATION

YIL 291 FIELD 13B,13F,11B, 5A

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, ILLINOIS

SOIL-AGGREGATE MIXTURES FOR HIGHWAY PAVEMENT

W. G. WESTALL, M. R. THOMPSON
/65- /

STATE-ILLINOIS

YOR 381 FIELD 7C, 7D,11G,20J

OREGON STATE UNIV, AGRICULTURAL EXPT STA, FOREST RESEARCH LAB, OREGON

LEGNIN SULFONATES IN PULP MILL EFFLUENTS

H. A. SCHROEDER

OREG-0767
/66- /

STATE-OREGON

ZQF 475503 1 FIELD 13+, 9+, 9C,12A

USAF, OAR, ARL, WRIGHT-PATT-CHEM RES, OHIO

SYNERGISTIC ENVIRONMENTAL EFFECTS

E. A. TOLLE
/65- /

DOD-AIR FORCE

ZQN 544118 1 FIELD 13G

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

FENDER SYSTEM STUDY

T. Y. LEE, J. T. OBRIEN
/65- /

DOD-NAVY

ZQN 544143 2 FIELD 12A,20K

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

ECCENTRICALLY LOADED LONG PILES

P. A. DANTZ
/65- /

DOD-NAVY

ZUA 5 2 FIELD 13B

USDI, GEOL SURV, DIST OF COLUMBIA

REFRACTION STUDY AND METHODS OF APPLICATION TO TRIGONOMETRIC LEVELING

F. F. BURGESS
/65- /

INTERIOR-GEOLOGICAL SURVEY

ZUA 690 2 FIELD 13G

USDI, GEOL SURV, DIST OF COLUMBIA

EFFECT OF PARTICLE SIZE DISTRIBUTION ON MECHANICS OF FLOW IN ALLUVIAL CHANNELS

R. K. FAHNESTOCK
/65- /

INTERIOR-GEOLOGICAL SURVEY

14. Methods and Equipment

GH 1539 FIELD 13B, 8G

USA, CORPS ENGR FT BLV, VIRGINIA

IN-SITU STUDIES OF ROCK AND SOILS FOR MANNED SPACE SCIENCE TEST SITES

. NONE

NASA-R-07-009-005
7/64- 8/64

NASA

GQF 104365 FIELD 1C

NORTH AMER AVIATION, CANOGA PARK, CALIFORNIA

RESEARCH ON ON-SITE INSPECTION TECHNIQUI

. NONE

AF-49-638-01467
/65- /

DOD-AIR FORCE

ZPE 1037 FIELD 6B,18A,20H,20F

US, AEC, OPER OFFICE, NEW YORK

LABORATORY COUNTING AND AUTOMATIC RECORDING EQUIPMENT

R. T. GRAVESON, D. C. FREESWICK
J. J. FREY, S. WATNICK
/66- /

AEC-BIOLOGY + MEDICINE

ZQF 260090 FIELD 1B,22D, 8F,15C

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

AREA EVALUATION

D. W. KLICK
/65- /

DOD-AIR FORCE

ZQF 260091 FIELD 8F, 8G, 8+, 9+

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

REMOTE SENSING

C. E. MOLINEUX
/65- /

DOD-AIR FORCE

ZQF 260107 FIELD 12A, 5C, 8E

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

ANALYSIS AND MODEL DEVELOPMENT

W. P. ELLIOTT
/65- /

DOD-AIR FORCE

ZQF 260134 FIELD 7D

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

INSTRUMENTATION AND OBSERVATION

R. A. VANTASSEL
/65- /

DOD-AIR FORCE

ZQF 260192 FIELD 9C, 9+

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

INSTRUMENTATION SUPPORT

N. S. HUNT
/65- /

DOD-AIR FORCE

ZQF 260553 FIELD 9+,12A, 9D, 9C

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

METHODOLOGY ORIENTED PROCESSOR IMPLEMENTATION

F. L. BLAZER
/65- /

DOD-AIR FORCE

ZQF 420548 FIELD 9C,13+, 9+, 9A

USAF, ARNOLD AFS, TENNESSEE

DEVELOPMENT OF HEAT TRANSFER + PRESSURE TRANSDUCERS FOR HYPERSONIC TESTS

W. E. SMOTHERMAN

AF-40-600-01000
/65- /

DOD-AIR FORCE

ZQN 542077 FIELD 12A, 5C

USN, BUR NAV PERSON, SAN DIEGO, CALIFORNIA

AUTOMATION OF OSD AND LOCK-ON TECHNIQUE

I. E. KAPLAN, D. A. WILSON
/65- /

8F,15C DOD-NAVY

ZQN 544207 1 FIELD 12A, 5C

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

FACTORS EFFECTING UTILITIES CONSUMPTION AND COST

C. E. PARKER, W. B. PLUM
/65- /

8+, 9+ DOD-NAVY

15. Military Sciences

GQF 4010 2 FIELD 19+

MASS INST OF TECHNOL, GRADUATE SCHOOL, MASSACHUSETTS

PROGRAM OF RESEARCH ON FOREIGN COMMUNICATIONS AND DEFENSE

P. I. DESOLA

AF-49-638-01237
/65- /

8E DOD-AIR FORCE

GQF 4550 FIELD 19+,15G,15C

BENDIX AVN. CORP, MICHIGAN

PROBLEMS OF US DEFENSE POLICY IN A WORLD OF NUCLEAR PROLIFERATION

R. H. CADY

AF-49-638-01582
/65- /

DOD-AIR FORCE

16. Missile Technology

GQF 259275 FIELD 5C,12A,13M

SPACE GENERAL CORP, EL MONTE, CALIFORNIA

CONTINUE SOUNDING ROCKET VIBRATION THEORETICAL AND EXPERIMENTAL INVESTIGATIONS

. NONE

9D, 9C AF-19-628-04333
/65- /

DOD-AIR FORCE

17. Navigation, Communications, Detection, and Countermeasures

GH 1043 FIELD 9+, 9A

9+, 9A STANFORD RESEARCH INST, MENLO PARK, CALIFORNIA

SURE FEASIBILITY ANALYSIS OF A DEEP-SPACE RECEIVING TERMINAL ANTENNA ARRAY OF LARGE EQUIVALENT APERTURE

. NONE

NAS-1-3075
8/63- 8/64

NASA

18. Nuclear Science and Technology

ZPE 1080 FIELD 18A,20H, 7D, 7B

US, AEC, BERKELEY, CALIFORNIA

DOSIMETRY OF HIGH ENERGY HEAVY PARTICLES

C. A. TOBIAS

/66- /

AEC-BIOLOGY + MEDICINE

ZPE 1194 FIELD 12A,20H, 5A,18A

US, AEC, OPER OFFICE, NEW YORK

GAMMA-RAY DOSIMETRY

J. E. MCLAUGHLIN, M. ALBERG, K. OBRIEN

/66- /

AEC-BIOLOGY + MEDICINE

ZPE 1351 FIELD 8K,12A, 8E,20H

ACCUMULATED PHYSICAL EFFECTS AT THE NEVADA TEST SITE

J. BROWN, E. PRICE
/66- /

AEC-BIOLOGY + MEDICINE

ZPE 1357 FIELD 8G, 6B, 9+,18A

AERIAL SURVEYS AND RADIOLOGICAL ASSISTANCE

E. J. STORY, A. S. TRUNDLE
/66- /

AEC-BIOLOGY + MEDICINE

ZQF 260058 FIELD 20J,18A,20F,20L

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

SOFT X RAY AND EUV INTERACTIONS WITH MATTER

D. E. BEDO
/65- /

DOD-AIR FORCE

19. Ordnance

ZQA 6 FIELD 20D,10B,15G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

FEASIBILITY + DESIGN STUDIES OF A NEW ENERGY ABSORPTION DEVICE

W. E. HEIDEL

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

ZQA 9 1 FIELD 12A, 5C,15C,15G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

FEASIBILITY AND DESIGN OF 105MM FIRE OUT-OF-BATTERY WEAPON

J. H. WILLIAMS

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

ZQA 19 FIELD 15C,19+

USA, ORD CORPS, SPRINGFIELD ARM, MASSACHUSETTS

ABCA AND NATO WORKING PARTY ON LINKS + CHARGERS

J. KWOLEK, J. FALCONE, V. LUUKKONEN

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

ZQN 530608 1 FIELD 19+

USN, WEAPON LAB DAHLGN, VIRGINIA

WEAPON SYSTEM SAFETY RESEARCH

J. F. BEE

/65- /

DOD-NAVY

20. Physics

GH 37 2 FIELD 11G,20K

UNIV OF CAL-BERKELEY, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, CALIFORNIA

THE EFFECT OF NON-LINEAR MATERIAL PROPERTIES ON THE STRESS DISTRIBUTION IN SPHERICAL SHELLS

E. P. POPOV

NASA-NSG-274-E-5
6/64- 5/65

NASA

GPF 553 FIELD 20M,20C, 5A,20L

UNIVERSITY OF ILLINOIS, GRADUATE SCHOOL, PHYSICS, ILLINOIS

ELECTRON AND NUCLEAR MAGNETIC RESONANCE

C. P. SLICHTER, J. ASIK, J. FRANZ
P. R. MORAN, J. PIPER, S. SATOH

AT-11-1-1198
10/64- 9/65

AEC-DIVISION OF PHYSICAL RES

GPF 559 FIELD 9+,20J,20C, 5A

MASS INST OF TECHNOL, SCHOOL OF ENGINEERING, NUCL ENGIN + NUCL SCI, MASSACHUSETTS

LASER LIGHT SCATTERING FROM A PLASMA

D. J. ROSE, L. M. LIDSKY, E. THOMPSON

AT-30-1-3221
5/64- 4/65

AEC-DIVISION OF PHYSICAL RES

GPF 936 FIELD 20M,11G,20J, 5A

UNIV OF CAL-L. A., GRADUATE SCHOOL, PHYSICS, CALIFORNIA

EXPERIMENTAL RESEARCH IN SOLID STATE PHYSICS BY MAGNETIC RESONANCE METHODS

A. G. CLARK, W. W. WARREN

AT(11-1)34-121
1/66-12/66

AEC-DIVISION OF PHYSICAL RES

GQF 1133 5 FIELD 12A,13M,20D

UNIVERSITY OF NAPLES, ITALY

NON-EQUILIBRIUM FLOW

L. G. NAPOLITANO

AF-61-052-00853
/65- /

DOD-AIR FORCE

GQF 1193 5 FIELD 12A,13M,20D

WEIZMANN INST OF SCI, ISRAEL

NUMERICAL INTEGRATION OF THE EQUATIONS OF VISCOUS FLUIDS

J. GILLIS

AF-EOAR-0086-65
/65- /

DOD-AIR FORCE

GQF 1361 4 FIELD 20D

CAL INST OF TECHNOLOGY, SCHOOL OF ENGINEERING, AERONAUTICS, CALIFORNIA

VISCOUS EFFECTS OF HEAT TRANSFER IN SEPARATED FLOWS

L. LEES

AF-49-638-01298
/65- /

DOD-AIR FORCE

GQF 3412 2 FIELD 12A,13M,20L,20K

UNIV OF CAL-DAVIS, GRADUATE SCHOOL, CALIFORNIA

EXTREMA OF EIGENVALUES OF VIBRATING SYSTEMS

D. D. BANKS

AF-AFOSR-0082-64
/65- /

DOD-AIR FORCE

GQF 4426 FIELD 3A, 4A,20J, 5A

4TH INTERNATIONAL CONFERENCE ON THE PHYSICS OF ELECTRONIC AND ATOMIC COLLISIONS

L. KERWIN

NIPR-0004-65
/65- /

DOD-AIR FORCE

GQF 259082 2 FIELD 9+, 9A,12A,

COLUMBIA UNIVERSITY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, NEW YORK

THEORETICAL STUDY OF EM ENERGY IN FERROELECTRIC-PLASMA WAVEGUIDES

S. P. SCHLESINGER

AF-19-628-02461
/65- /

DOD-AIR FORCE

GQF 259582 2 FIELD 12A,20H,20J,

BOSTON UNIVERSITY, GRADUATE SCHOOL, PHYSICS, MASSACHUSETTS

RIGOROUS DESCRIPTION OF IRREVERSIBILITY IN CLASSICAL PLASMAS

C. R. WILLIS

AF-19-628-02460
/65- /

DOD-AIR FORCE

GQF 259931 FIELD 7C, 7D,12A

CASE INST OF TECHNOL, SCHOOL OF ENGINEERING, ENGINEERING, OHIO

THEOR + EXPER EFFORT ON DEPOSITION OF DIAMOND THIN FILMS ON DIAMOND SUBSTRATES AT MODERATE PRESSURES

J. C. ANGUS

AF-19-628-04785
/65- /

DOD-AIR FORCE

GQF 284955 2 FIELD 20L

TECH HIGH SCH MUNICH, GERMANY

STRESS CONCENTRATION UNDER FATIGUE LOADING

H. NEUBER

AF-61-052-00671
/65- /

DOD-AIR FORCE

GSE 84 4 FIELD 20L,20D

JOHNS HOPKINS UNIV, SCHOOL OF ENGINEERING, MECHANICS, MARYLAND

ISOTROPIC TURBULENCE

S. CORRSIN

NSF-GK-659
1/66-12/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 847 1 FIELD 12A,13M,20L

UNIV OF CAL-BERKELEY, SCHOOL OF ENGINEERING, INST ENGINEERING RES, CALIFORNIA

VIBRATION OF NONLINEAR SYSTEMS HAVING MANY DEGREES OF FREEDOM

R. M. ROSENBERG, C. P. ATKINSON

NSF-G-24835
7/63-12/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 811 FIELD 7A,20M

JOULE-THOMSON COEFFICIENTS OF GAS MIXTURES

L. A. WENZEL

NSF-GK-458
7/65- 7/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 828 FIELD 20M

WEST VIRGINIA UNIV, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, WEST VIRGINIA

APPLICATION AND EXTENSION OF THE MINIMUM ENTROPY PRINCIPLE

M. W. BUTLER

NSF-GK-461
6/65- 6/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 830 FIELD 7D

NORTHWESTERN UNIV, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, ILLINOIS

DEFORMING FREE SURFACES

J. C. SLATTERY

NSF-GK-450
6/65- 6/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 835 FIELD 7A,20M

MASS INST OF TECHNOL, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, MASSACHUSETTS

THE THERMODYNAMICS OF IRREVERSIBLE PROCESSES

J. H. KEENAN, G. N. HATSOPOULOS

NSF-GK-192
4/65- 4/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 858 FIELD 7D,20M,20D

SYRACUSE UNIVERSITY, SCHOOL OF ENGINEERING, CHEMICAL + METAL ENGIN, NEW YORK

NATURAL CONVECTION HEAT TRANSFER FROM FLAT SURFACES IN NON-NEWTONIAN FLUIDS

C. TIEN

NSF-GK-408
5/65- 5/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 859 FIELD 20K

UNIV OF NOTRE DAME, SCHOOL OF ENGINEERING, ENGINEERING SCIENCE, INDIANA

INELASTIC INSTABILITY OF CYLINDRICAL SHELLS

L. H. LEE

NSF-GK-443
6/65- 6/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 872 FIELD 20D,20K,10B, 5A

BROWN UNIVERSITY, GRADUATE SCHOOL, PHYSICS, RHODE ISLAND

HYDRODYNAMIC STABILITY BETWEEN ROTATING CYLINDERS

A. K. KARLSSON, H. A. SNYDER

NSF-GK-168
2/65- 2/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 878 FIELD 20L

ANISOTROPIC VISCOELASTICITY

C. C. HSIAO

NSF-GK-212
3/65-10/65

NSF-ENGINEERING SCIENCES DIVISION

GSP 2299 FIELD 12A

POLYTECH INST BROOKLYN, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

ANALYSIS OF WAVE PROPAGATION

A. HOCHSTADT, E. ZAUDERER

NSF-GP-4171
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2403 FIELD 20L

JOHNS HOPKINS UNIV, SCHOOL OF ENGINEERING, MECHANICS, MARYLAND

NON-LINEAR MECHANICS OF MATERIALS

C. A. TRUESDELL

NSF-GP-4662
7/65- 7/66

NSF-PHYSICAL SCIENCES DIVISION

PRW 74 1 FIELD 12A,20J, 7B

QUANTUM MECHANICAL INVESTIGATIONS OF THE CHEMICAL AND PHYSICAL PROPERTIES OF CERTAIN ATOMIC AND MOLECULAR SYSTEMS

C. M. WONACK

J-115
5/65- 4/66

WELCH, ROBERT A FOUNDATION-TEXAS

ZBA 1893 FIELD 7D

USDC, NATL BUR STAN, BOULDER, COLORADO

NSRDS SPECTRAL TABLES

Y. BEERS

NBS-2510104
/65- /

COMMERCE-NATIONAL BUREAU OF STANDARDS

ZQA 22 FIELD 11G,11C,13H, 5A

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

ELASTIC-PLASTIC STRAIN ANALYSIS

T. MACLAUGHLIN

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

ZQA 24 FIELD 12A,13M,20L,20K

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

EXTERNAL PRESSURIZATION OF A THICK SPHERICAL CAP

M. SADOWSKY

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

ZQA 26 FIELD 12A,13M,20L,20D

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

MECHANICS OF IMPACT

W. DUNN

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

ZQA 36 FIELD 11B,11C,11F,11G

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

FRACTURE IN PRESSURIZED THICK-WALLED HIGH STRENGTH CYLINDERS

F. SAUTTER, O. PAUL

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

ZQA 39 FIELD 20L,20K,15G

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

PHOTOELASTIC INVESTIGATION OF PRESSURE STRESSES IN CYLINDERS

T. MACLAUGHLIN

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

ZQA 42 FIELD 20L,15G

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

STUDY OF A TECHNIQUE FOR ASSESSING CUMULATIVE FATIGUE DAMAGE

R. E. WEIGLE

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

ZQF 260003 FIELD 4A, 8+, 9+

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

OBLIQUE INCIDENCE IONOSPHERIC PROPAGATION

L. J. MCCABE

/65- /

DOD-AIR FORCE

ZQF 260013 FIELD 9+, 9C,20J,20L

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

SOLID STATE PHYSICS

R. CORNELISSEN

/65- /

DOD-AIR FORCE

ZQF 260015 FIELD 7A,20M,20J, 7D

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

LATTICE DYNAMICS

J. N. PLENDL

/65- /

DOD-AIR FORCE

ZQF 260034 FIELD 7D,14E,20J,20F

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

EXTREMELY HIGH TEMPERATURES

H. FISCHER

/65- /

DOD-AIR FORCE

ZQF 260035 FIELD 20J,20D,20F

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

COHERENCE IN RADIATION AND ITS INTERACTIONS

P. SCHWEITZER

/65- /

DOD-AIR FORCE

ZQF 260036 FIELD 6B, 9+,12A, 9C

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

PHYSICAL OPTICS

G. A. VANASSE

/65- /

DOD-AIR FORCE

ZQF 260039 FIELD 4A, 9+, 9A,12A

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

ELECTROMAGNETIC RADIATORS AND SCATTERING

P. BLACKSMITH

/65- /

DOD-AIR FORCE

ZQF 260040 FIELD 9+, 9A,11G,20F

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

ELECTROMAGNETIC INTERACTION WITH MATERIALS AND PLASMAS

W. W. GERBES

/65- /

DOD-AIR FORCE

ZQF 260061 FIELD 18A,20F

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

NON OPTICAL XUV SPECTROMETRY

J. E. MANSON

/65- /

DOD-AIR FORCE

ZQF 260109 FIELD 20D

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

DIFFUSION STUDIES

J. H. TAYLOR

/65- /

DOD-AIR FORCE

ZQF 260142 FIELD 3A, 3B, 4A,20F

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

INFRARED SPECTROMETRIC TECHNIQUES

G. A. VANASSE

/65- /

DOD-AIR FORCE

ZQF 260144 FIELD 3A, 4A,20J

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

INFRARED MOLECULAR SPECTROSCOPY

J. S. GARING

/65- /

DOD-AIR FORCE

ZQF 260145 FIELD 12A,20H,20J,20F

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

OPTICAL PHYSICS

G. A. VANASSE

/65- /

DOD-AIR FORCE

ZQF 260160 FIELD 20I

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

PLASMA AND MAGNETIC FIELDS IN FLOW

M. LEVINE

/65- /

DOD-AIR FORCE

ZQF 260161 FIELD 3A, 3B, 4A,20I

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

PLASMA AND MAGNETIC FIELDS IN EQUILIBRIUM

M. LEVINE

/65- /

DOD-AIR FORCE

ZQF 260163 FIELD 3A, 3B, 4A

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

ELECTRIC FIELDS CURRENTS AND CONDUCTIVITY

M. SMIDDY

/65- /

DOD-AIR FORCE

ZQF 260188 FIELD 20I

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

THEORETICAL PLASMA PHYSICS AND DYNAMICS

R. S. KUSHWAHA

/65- /

DOD-AIR FORCE

ZQF 260189 FIELD 3A, 4A,20I

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

EXPERIMENTAL PLASMA PHYSICS AND DYNAMICS

R. S. KUSHWAHA

/65- /

DOD-AIR FORCE

ZQF 260201 FIELD 20M, 9+, 9C,20J

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

THERMAL PROCESSES

C. C. LEIBY

/65- /

DOD-AIR FORCE

ZQF 260540 FIELD 4A, 9+, 9A,12A

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

INFORMATION EXTRACTION BY E M WAVES

C. J. DRANE

/65- /

DOD-AIR FORCE

ZQF 284601 8 FIELD 9+,20J,20F,20I

USAF, OAR, ARL, WRIGHT-PATT-APPL MATH, OHIO

INTERACTION OF ELECTROMAGNETIC WAVES WITH PLASMAS

E. M. FRIAR

/65- /

DOD-AIR FORCE

ZQF 284610 12 FIELD 7D, 9+, 9C,20J

USAF, OAR, ARL, WRIGHT-PATT-APPL MATH, OHIO

CRYSTALLINE MATERIAL BOMBARDMENT

W. C. KREYE

/65- /

DOD-AIR FORCE

21. Propulsion and Fuels

GH 1553 FIELD 7C,21B,21I, 7B

STEVENS INST OF TECH, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, NEW JERSEY

INVESTIGATION OF THE FLAME SPREADING OVER THE SURFACE OF IGNITED SOLID PROPELLANTS

A. F. MCALEVY, S. Y. LEE

NASA-NGR-31-003-014
10/64- 9/65

NASA

GQF 4020 2 FIELD 21I

ILLINOIS INST OF TECH, GRADUATE SCHOOL, ILLINOIS

ADVANCED OXIDIZER CHEMISTRY

I. J. SOLOMON

AF-49-638-01175
/65- /

DOD-AIR FORCE

J. B. LEVY

AF-49-638-01169
/65- /

DOD-AIR FORCE

GQF 4021 3 FIELD 7C,19D,21I, 7D

ATLANTIC RESEARCH CORP, VIRGINIA

DEFLAGRATION OF HIGH-ENERGY SOLID OXIDIZERS

GQF 14106 FIELD 7C, 7D,21B, 7A

COMBUSTION KINETICS OF TETRAFLUOROETHYLENE

R. A. MATULA

AF-AFOSR-0981-65
/65- /

DOD-AIR FORCE

GSE 856 FIELD 21B,20J

UNIV OF NOTRE DAME, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, INDIANA

STRUCTURE OF LAMINAR FLAMES

I. F. WEHNER

NSF-GK-523
7/65- 4/67

NSF-ENGINEERING SCIENCES DIVISION

ZQF 284612 2 FIELD 21B,21D, 7D, 7A

USAF, ARNOLD AFS, TENNESSEE

SHOCK INDUCED COMBUSTION

P. M. RUBINS

AF-40-600-01000
/65- /

DOD-AIR FORCE

22. Space Technology

ZQF 260111 FIELD 22A,22D, 9C, 9+

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

VEHICLES AND FLIGHT PLANNING

P. E. GUSTAFSON

/65- /

DOD-AIR FORCE

ZQF 260112 FIELD 22A,22D, 9C, 9+

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

DATA RECOVERY

C. H. REYNOLDS

/65- /

DOD-AIR FORCE

ZQF 284808 FIELD 22C, 3C,12A,20M

USAF, AF ACADEMY, ACADEMY, COLORADO

DETERMINATION OF FIRST ORDER STABILITY FOR PERIODIC ORBITS IN THE RESTRICTED PROBLEM OF THREE BODIES

A. F. SCHANZLE

/65- /

DOD-AIR FORCE

1, 7D

8, 7A

7D, 7A

9C, 9+

9C, 9+

2A,20H

TY
D

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TECHNICAL ABSTRACT BULLETIN

Field 1-AERONAUTICS

1/1. AERODYNAMICS

AD-631 494 Fld. 1/1
CFSTI Prices: HC $5.60 MF $0.75
CORNELL AERONAUTICAL LAB INC BUFFALO N Y
DERVIATION OF ROTOR BLADE GENERALIZED AIR LOADS FROM MEASURED FLAPWISE BENDING MOMENT AND MEASURED PRESSURE DISTRIBUTIONS.
Final rept., Jun 64-Sep 65,
by Frank A. DuWaldt, and Irving C. Statler. Mar 66, 60p. Rept. no. CAL-BB-1959-S-1,
Contract DA-44-177-AMC-198 (T), Proj. DA-1P125901A14229,
USAAVLABS TR-66-13

Unclassified report

Descriptors: (*Helicopter rotors, Loading (Mechanics)), (*Rotor blades (Rotary wings), Loading (Mechanics)), (*Aerodynamic loading, Rotor blades (Rotary wings)), Propeller blades, Pressure, Distribution, Moments, Statistical functions, Bending

A limited study of methods of deducing generalized air loads acting on a helicopter rotor blade or a propeller blade from bending-moment measurements is presented. A new set of basic functions called 'orthonormal-moment distributions' is proposed as the best set for fitting the moment data. The blade-tip deflections computed from pressure distributions measured on an H-34 helicopter rotor in steady level flight at 112 knots are compared with tip deflections derived by four methods based on use of measured bending-moment distributions. The degree of agreement between quantities obtained from the pressure distributions and those obtained from the moment distributions is encouraging but not satisfactory. Neither the lift nor the moment distributions were measured with sufficient accuracy for the purposes of the study. Deficiencies in the accuracy of the measurements and in the accuracy of the description of the blade mass and elastic characteristics obscure any meaningful differences between the various methods of operating on the moment data. (Author)

AD-631 293 See Fld. 22/3

AD-631 314 See Fld. 12/2

AD-631 502 See Fld. 1/2

AD-631 521 See Fld. 20/4

AD-631 628 See Fld. 20/1

AD-631 777 See Fld. 1/3

1/2. AERONAUTICS

AD-631 502 Fld. 1/2, 1/3, 1/1
CFSTI Prices: HC $3.60 MF $0.50
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
BALLOON ASCENT TRAJECTORY DISPERSION OVER THE UNITED STATES AT 60,000 FT AND 100,000 FT.
Air Force Surveys in geophysics,
by George F. Nolan. Feb 66, 33p. Proj. AF-6665, Task 666506,
AFCRL AFSIG-174 ,AFCRL 66-98

Unclassified report

Descriptors: (*Balloons, *Ascent trajectories), Flight paths, Mission profiles, Climatology, Meteorological parameters, Correlation techniques, Atmospheric sounding, Meteorological charts

A series of seasonal statistical charts is presented which can be used for obtaining estimates of ascent trajectory dispersion at altitudes of 60,000 ft and 100,000 ft for balloons launched from locations within the United States. The charts give isopleth mappings of mean ascent trajectory components, angle of rotation of axes of the dispersion patterns, and standard deviations of the components along the major and minor distribution axes. The chart data and outlined procedures furnish the means for constructing balloon ascent trajectory dispersion patterns, with a minimum amount of time and effort for any specified constant balloon ascent rate and for any desired degree of probability. These dispersion patterns provide useful planning information for purposes of air safety and other operational considerations. An analysis of the stability of the mean ascent trajectories shows a wave pattern distribution over the United States with a ridge of maximum stability, or minimum dispersion, centered along longitude 110 degrees and troughs of minimum stability, or maximum dispersion, located over the Northeast and over the Northwest. (Author)

AD-631 610 Fld. 1/2, 13/4
CFSTI Prices: HC $4.00 MF $0.75
AVIATION SAFETY ENGINEERING AND RESEARCH PHOENIX ARIZ
AIRCRAFT FUEL TANK DESIGN CRITERIA.
Final technical rept.,
by S. Harry Robertson, and James W. Turnbow. Mar 66, 121p. Rept. no. AvSER-65-17,
Contract DA-44-177-AMC-254 (T) Task 1A024701A2101,
USAAVLABS TR-66-24

Unclassified report

Descriptors: (*Fuel tanks, Specifications), (*Aircraft fires, Fuel tanks), (*Aviation accidents, Aircraft fires), Design, Aviation safety, Aircraft, Control, Hazards, Fluid flow, Deceleration, Loading (Mechanics), Materials, Walls, Toughness, Drop testing

Accident statistics indicate that postcrash fire is the most serious threat to human life in aircraft crashes. Several methods are available to reduce this hazard; however, the simplest and most effective immediate method is through control of the fuel spillage. Accident investigation reveals that fuel tanks developed to current crash resistant fuel tank specifications fail even under relatively moderate crash conditions. A discussion of the factors which must be considered when establishing specifications that will result in a crashworthy fuel tank is presented. Experiments were conducted with fuel tank material specimens and with experimental fuel tanks subjected to actual aircraft crashes. Results indicate that fuel tanks can be built today that are capable of preventing fluid spillage during accidents involving decelerative loading above the human survival range. Evaluation of the test data indicates that additional analysis is needed in order to understand fully why certain materials function as excellent tank materials and others do not. Two types of materials, 'Fuzzy Wall' and 'Tough Wall', are shown to have demonstrated good crash resistant characteristics. (Author)

AD-631 583 See Fld. 20/5

1/3. AIRCRAFT

AD-631 348 Fld. 1/3, 20/11
CFSTI Prices: HC $2.00 MF $0.50
NATIONAL AERO- AND ASTRONAUTICAL RESEARCH INST AMSTERDAM (NETHERLANDS)
FATIGUE TEST RESULTS OF TWO FULL-SCALE WING CENTER SECTIONS UNDER GROUND-TO-AIR CYCLE LOADING.
Scientific rept.,
by J. Schijve, and D. Broek. 15 Apr 65, 46p.
Rept. no. Scientific-6,NLR-S.635
Contract AF 61 (052)-439,

Unclassified report

Descriptors: (*Wings, Fatigue (Mechanics)), (*Loading (Mechanics), Wings), Fracture (Mechanics), Tests, Netherlands

In a previous program 8 similar specimens were tested, two at each of the following load sequences: (1) random load, (2) programmed load, (3) random load with ground-to -air cycles, (4) programmed load with ground-to-air cycles. The present two tests consist of ground-to-air cycles (GTAC) only. The following trends were observed: (1) the picture of fatigue critical cracks was somewhat different in the GTAC tests than in the eight previous tests, (2) the damaging effect of GTAC of the previous tests reasonably obeys the linear damage rule. (Author)

AD-631 349 Fld. 1/3, 20/11
CFSTI Prices: HC $2.00 MF $0.50
NATIONAL AERO- AND ASTRONAUTICAL RESEARCH INST AMSTERDAM (NETHERLANDS)
STRAIN MEASUREMENTS ON EIGHT FULL-SCALE WING CENTER SECTIONS.
Scientific rept.,
by P. J. Sevenhuysen, A. Nederveen, and J. Schijve. 20 Dec 63, 47p. Rept. no. Scientific-3,NLR-S.610
Contract AF 61 (052)-439,

Unclassified report

Descriptors: (*Wings, Fatigue (Mechanics)), (*Strain (Mechanics), Wings), Loading (Mechanics), Tests, Captive tests, Stresses, Netherlands

For an investigation on the equivalence of random and programmed fatigue loads eight full-scale wing center sections were tested. Each fatigue test was preceded by a static test to check the similarity of the stress distribution in all tension skins. In the report the results of these static tests are presented and an analysis of the trends observed is given. The maximum load in the static test was only slightly beyond the mean load of the fatigue tests. The following observations were made: (a) The strain measurements made on port and starboard of the tension skin are in good agreement (b) The same applies to the strain measurements made on all eight tension skins at the same location. (c) At the same location on different tension skins the average value of the standard deviation was 2%. The scatter is mainly due to the measurement techniques and not to differences between the tension skins. (d) Secondary bending, although small, increased somewhat the scatter of the results. (e) The effect of fatigue loading on the output of the strain gages was very small, despite the high fatigue loading which induced failure of many gages. (Author)

AD-631 350 Fld. 1/3, 12/1
CFSTI Prices: HC $1.10 MF $0.50
AERONAUTICAL RESEARCH INST OF SWEDEN STOCKHOLM
DEVELOPMENT OF STATISTICAL METHODS FOR DESIGNING AIRCRAFT WITH RESPECT TO FATIGUE.
Technical note,
by Bo K. O. Lundberg, and Sigge Eggwertz. 26 Sep 61, 4p. Contract AF 61 (052)-431,

Unclassified report

Descriptors: (*Aircraft, Design), (*Statistical analysis, Fatigue (Mechanics)), Structural parts, Fracture (Mechanics)

AD-631 351 Fld. 1/3, 12/1, 14/4
CFSTI Prices: HC $2.60 MF $0.50
AERONAUTICAL RESEARCH INST OF SWEDEN STOCKHOLM

INSPECTION PERIODS DETERMINED FROM DATA OF CRACK DEVELOPMENT AND STRENGTH REDUCTION OF AN AIRCRAFT STRUCTURE USING STATISTICAL METHODS FOR DESIGNING AIRCRAFT WITH RESPECT TO FATIGUE.
Technical note.
by Sigge Eggwertz. Jun 61, 29p. Rept. no. TN-1, Contract AF 61 (052)-431.

Unclassified report

Prepared for presentation at the ICAF-AGARD Fatigue Symposium in Paris, May 16-18, 1961.

Descriptors: (*Aircraft, Design), (*Statistical analysis, Fatigue (Mechanics)), Structural parts, Life expectancy, Fracture (Mechanics)

Regular inspections of an aircraft structure might form a very effective means of providing an adequate safety level when the inspection periods are determined by statistical analysis. If it is assumed that a crack of a certain minimum length, is always detected at the inspections, it is possible to calculate the probability of collapse of the structure for any inspection period and limit life of the structure, provided the load spectrum, the time to critical-crack initation, as well as the crack propagation and the corresponding reduction of the ultimate strength, are known from experimental investigations. Using such data available in the literature, numerical evaluations have been made, assuming various stress levels and inspection periods. From the results, the appropriate inspection periods are determined and compared with the crack propagation time to final failure. The approximations introduced in the statistical analysis, are discussed, and suggestions are made for future theoretical and experimental investigations. (Author)

AD-631 365 Fld. 1/3, 20/11
CFSTI Prices: HC $1.10 MF $0.50
NATIONAL AERO- AND ASTRONAUTICAL RESEARCH INST AMSTERDAM (NETHERLANDS)
THE RESULTS OF THE STATIC TEST ON THE FOURTH F 27 TENSION SKIN.
7 Aug 62, 3p. Rept. no. MS-62-40, Contract AF 61 (052)-439.

Unclassified report

Descriptors: (*Wings, Stresses), (*Stress (Mechanics), Wings), Captive tests, Tables, Loading (Mechanics), Netherlands

Strain measurements were carried out. The results of the test are presented.

AD-631 390 Fld. 1/3, 20/11
CFSTI Prices: HC $1.10 MF $0.50
NATIONAL AERO- AND ASTRONAUTICAL RESEARCH INST AMSTERDAM (NETHERLANDS)
RESULTS OF THE STATIC STRAIN GAUGE MEASUREMENTS ON THE FIFTH F 27 TENSION SKIN.
10 Aug 62, 4p. Rept. no. MS-62-56, Contract AF 61 (052)-439.

Unclassified report

See also AD-631 365.

Descriptors: (*Wings, Stresses), (*Strain (Mechanics), Wings), Captive tests, Tables, Loading (Mechanics), Measurement, Distribution, Netherlands

In order to check the stress distribution in the fifth F 27 tension skin, strain measurements were carried out. The results of the test are presented including the corresponding results of the former specimens. The results show a satisfactory agreement with those of the four specimens tested previously.

AD-631 397 Fld. 1/3, 13/13
CFSTI Prices: HC $2.60 MF $0.50
ROME UNIV (ITALY) SCUOLA DI INGEGNERIA AERONAUTICA
STRUCTURAL ANALYSIS USING THE BALANCE METHOD.
Final rept.,
by Luigi Broglio. Dec 55, 27p. Rept. no. SIAR-graph-5,
Contract AF 61 (514)-422.

Unclassified report

Descriptors: (*Airframes, *Statics), Aeronautics, Aerodynamic configurations, Load distribution, Mathematical analysis, Structures

The work is divided in three parts: Part 1 deals with the general rules of Balance--Method (B.M.), which is a general method of solution of problems of Mathematical Physics, originated by the Author; part 2 deals with the B.M. application to advanced aeronautical structures (multistringers shells, stressed--skin wings, etc.); and part 3 deals with the application of B.M. to the swept wing problem. For this latest problem, it was, before all, necessary, to develop an adequate theory. The equations given by such theory were then integrated by using the B.M. For each of the above parts, a Technical Report was prepared. The three Technical Reports are summarized in this paper. (Author)

AD-631 413 Fld. 1/3, 21/5
CFSTI Prices: HC $17.20 MF $1.00
HUGHES TOOL CO CULVER CITY CALIF AIRCRAFT DIV
GROUND AND FLIGHT TESTS, XV-9A HOT CYCLE RESEARCH AIRCRAFT.
Summary rept., 10 Aug 64-5 Feb 65,
by C. W. Pieper. Mar 66, 156p. Rept. no. HTC-AD-65-13,
Contract DA-44-177-AMC-877 (T) Task 1M121401D14403,
USAAVLABS TR-65-68

Unclassified report

Descriptors: (*Gas turbines, Thermodynamic cycles), (*Vertical take-off planes, Tests), (*Thermodynamic cycles, Helicopter engines), (*Helicopter engines, Performance (Engineering)), Helicopter rotors, Flight testing, Structural properties, Propulsion, Research planes, Feasibility studies, Test equipment, Loading (Mechanics), Cooling

The performance, structural qualities, and feasibility of the Hot Cycle rotor and propulsion system were successfully verified for all normal helicopter flight modes. Ground tests consisted of preflight and tie-down tests, which provided a functional checkout of the aircraft systems and test instrumentation and a final checkout of the completed aircraft prior to start of flight tests. The 15 hours of flight testing included evaluation of aircraft and rotor system performance, flight loads, cooling, and flying qualities in various flight modes. (Author)

AD-631 466 Fld. 1/3, 13/9
CFSTI Prices: HC $3.00 MF $0.75
BERGEN RESEARCH ENGINEERING CORP TETERBORO N J
EVALUATION STUDY OF BALANCED LOAD PLANETARY TRANSMISSION AND DESIGN OF 250-HORSEPOWER UNIT WITH 4000-HOUR TIME BETWEEN OVERHAUL (TBO).
Final rept.,
by Stanley W. Baker, Charles S. Davis,Jr., and William H. Schwab. Jan 66, 81p. Rept. no. 8314-R3,
Contract DA-44-177-AMC-102 (T) Task 1D121401D14404,
USAAVLABS TR-64-30

Unclassified report

Descriptors: (*Transmissions, *Helicopters), (*Reduction gears, Helicopters), Helicopter engines, Transmission gears, Performance (Engineering), Optimization, Programming (Computers), Life expectancy, Maintainability

This report presents a complete review of the parametric design and computer studies performed to evaluate the Bergen Research Compound Planetary Transmission concept in three configurations for a helicopter transmission. All three concepts embody design arrangements which assure uniform load division with multiple compound planetary gears. Uniform loading is accomplished by balancing the primary and secondary meshing point positions through low rate springing. These systems stabilize at the gear mesh positions of load path equalization. Design are established for typical power ranges using consistent gear and bearing design factors. Both 1000 and 4000 hour time before overhaul design factors are studied to determine their feasibility and design trade off requirements. The Phase I study results are applied in Phase II to the preferred design concept through completion of a specific layout and detail design. This 250 Horsepower/4000 Hour design is suitable for fabrication and life testing. (Author)

AD-631 467 Fld. 1/3, 19/4, 11/2, 11/4, +
CFSTI Prices: HC $3.00 MF $0.75
NORTH AMERICAN AVIATION INC COLUMBUS OHIO
FEASIBILITY OF ARMOR MATERIAL AS BASIC AIRCRAFT STRUCTURE.
Final rept.,
by D. G. Whinery. Mar 66, 96p. Contract DA-44-177-AMC-189 (T) Task 1P121401A15003, USAAVLABS TR-66-5

Unclassified report

Descriptors: (*Armor, Materials), (*Aircraft, Armor), Airplane panels, Aircraft equipment, Feasibility studies, Structural parts, Transparent panels, Ceramic materials, Glass textiles, Steel, Costs, Mechanical properties, Ballistics, Aircraft seats, Laminated plastics

The use of selected armor materials as primary, secondary, and transparent aircraft structure was studied and determined to be both feasible and practical. Solutions to the several problems in design, fabrication, and repair of both opaque and transparent armor are presented. A comparison indicates that use of structural armor instead of kit armor saves 10 lbs. to 62 lbs. for a single -place aircraft subjected respectively to sporadic and to concentrated small-arms fire throughout the lower hemisphere. In addition, an aircraft design using structural armor will have fewer total parts and will have a lower cost unless an unusual pricing structure exists. Ceramic-faced, non-delaminating fiber glass is recommended for minimum weight, for the most effective maintenance of ballistic and structural properties over extended service life, and for faceted contours. Dual hardness steel armor is recommended for low first cost, for maximum strength, for high hit-density, and for flat or slightly contoured panels. (Author)

AD-631 572 Fld. 1/3, 20/11
CFSTI Prices: HC $2.00 MF $0.50
NATIONAL AERO- AND ASTRONAUTICAL RESEARCH INST AMSTERDAM (NETHERLANDS)
EXPERIMENTAL DETAILS OF TESTING A FULL-SCALE STRUCTURE WITH RANDOM AND PROGRAMMED FATIGUE LOAD SEQUENCES.
Scientific rept.,
by A. Nederveen, P. de Rijk, D. Broek, and J. Schijve. 31 Jan 64, 30p. Rept. no. Scientific-1,NLR-S.608
Contract AF 61 (052)-439,

Unclassified report

Descriptors: (*Wings, Loading (Mechanics)), (*Fatigue (Mechanics), Wings), Tests, Test equipment, Visual inspection, Fracture (Mechanics), X rays, Netherlands, Transport planes

For an investigation on the equivalence of random and programmed fatigue loads, eight full-scale wing center sections were tested. The report describes the fatigue machine developed for this purpose and some testing experience. Load monitoring of the hydraulic machine occurs by comparing a feed-back signal from a load-cell with the output of a selected Wheatstone circuit with an adjustable potentiometer. There are 32 circuits which can be selected by a digital tape reader in any arbitrary

sequence. In this way a random sequence of 32 load levels can be applied. The hydraulic and the electronic parts are described in some detail. In eight fatigue tests a good reliability and accuracy were obtained. During the fatigue tests the inspections for cracks were made visually and with X-ray equipment. Visual inspections were made when the test was running, in view of the increased sensitivity. The results of the X-ray method for small cracks were very sensitive for the mean load in the structure. Useful results were obtained. (Author)

AD-631 573 Fld. 1/3, 20/11
CFSTI Prices: HC $2.00 MF $0.50
NATIONAL AERO- AND ASTRONAUTICAL RESEARCH INST AMSTERDAM (NETHERLANDS)
FATIGUE LOADS APPLIED ON A FULL-SCALE STRUCTURE IN RANDOM AND PROGRAMMED SEQUENCES.
Scientific rept.,
by J. Schijve. 30 Apr 64. 31p. Rept. no. Scientific-2,NLR-S.609
Contract AF 61 (052)-439,
Unclassified report

Descriptors: (*Wings, Loading (Mechanics)), (*Fatigue (Mechanics), Wings), Structures, Sequences, Tests, Netherlands, Transport planes

For an investigation on the equivalence of random and programmed fatigue loads eight full-scale wing center sections were tested. The report describes the load sequences applied in the tests. The random sequence was derived from a strain-gage record obtained with an aircraft flying in turbulent air. This record was amplified and adapted to the fatigue machine. The statistical properties as obtained by several methods, counting peak loads or load ranges, are presented. The load sequence for the program tests and the assessment of the ground-to-air cycles are described. The loads applied in each of the eight tests are summarized. Brief comments on the results are given. (Author)

AD-631 574 Fld. 1/3, 20/11
CFSTI Prices: HC $2.00 MF $0.50
NATIONAL AERO- AND ASTRONAUTICAL RESEARCH INST AMSTERDAM (NETHERLANDS)
FATIGUE LIVES OBTAINED IN RANDOM AND PROGRAM TESTS ON FULL-SCALE WING CENTER SECTIONS.
Scientific rept.,
by J. Schijve, and P. de Rijk. 15 Dec 63. 48p.
Rept. no. Scientific-4,NLR-S.611
Contract AF 61 (052)-439,
N65 12240
Unclassified report

Descriptors: (*Wings, Loading (Mechanics)), (*Fatigue (Mechanics), Wings), Aerodynamic loading, Tests, Sequences, Simulation, Life expectancy, Statistical analysis, Netherlands, Transport planes

Fatigue tests were conducted on eight full-scale wing center sections of the F-27 Friendship aircraft. The specimen consisted of the tension skin, including all stiffening elements. The remainder of the wing was replaced by a dummy structure. Two tests were carried out for each of the following load sequences: (1) random load (2) programmed load (3) random load with ground-to-air cycles (4) programmed load including ground-to-air cycles. The random loading was based on a simulation of strain gage records obtained by flying in turbulent air. The primary aim of the investigation was to study the equivalence of random and programmed loadings. A comparison of the fatigue lives and the critical components indicated the following trends: (a) Cracks were found in the same components for all tests. (b) The fatigue life under the programmed load was slightly longer than in the random load tests, both for tests without and with ground-to-air cycles. (c) The addition of ground-to-air cycles reduced the fatigue life to 50% or even less. For one fatigue-sensitive element sufficient data were available for a statistical evaluation; this indicated that the scatter within one structure may be smaller than the variability between a number of identical structures. (Author)

AD-631 575 Fld. 1/3, 20/11
CFSTI Prices: HC $3.00 MF $0.75
NATIONAL AERO- AND ASTRONAUTICAL RESEARCH INST AMSTERDAM (NETHERLANDS)
CRACK PROPAGATION AND RESIDUAL STRENGTH OF FULL SCALE WING CENTER SECTIONS.
Scientific rept.,
by D. Broek. 1964. 62p. Rept. no. Scientific-5,NLR-S.612
Contract AF 61 (052)-439,
Unclassified report

Descriptors: (*Wings, Loading (Mechanics)), (*Fatigue (Mechanics), Wings), (*Failure (Mechanics), Wings), Tensile properties, Propagation, Tests, Simulation, Netherlands, Transport planes

Fatigue tests were conducted on eight full-scale wing center sections of the Fokker F.27 aircraft. The specimen consisted of the tension skin, including all stiffening elements. The remainder of the wing was replaced by a dummy structure. Two tests were carried out for each of the following load sequencies: (1) random load, (2) programmed load, (3) random load with ground-to-air cycles, (4) programmed load including ground-to-air cycles. The random loading was based on a simulation of strain gage records obtained by flying in turbulent air: The primary aim of the investigation was to study the equivalence of random and programmed loadings. A comparison of the crack propagation data indicated the following trends: (a) crack propagation was slightly higher under a randomly varying load than under a programmed load sequence, (6) addition of the ground-to-air cycles increased crack propagation rates by an amount of about 50%. As for the residual static strength of the structure in the presence of cracks the following remarks can be made: (a) if cracks are short the structure behaves like an unstiffened panel, (b) for long cracks the stringers become effective in raising the residual strength. (Author)

AD-631 656 Fld. 1/3
CFSTI Prices: HC $10.60 MF $0.75
NORTH AMERICAN AVIATION INC COLUMBUS OHIO
APPLICATION OF APPLIED LOAD RATIO STATIC TEST SIMULATION TECHNIQUES TO FULL-SCALE STRUCTURES; VOLUME I, METHODS OF ANALYSIS AND DIGITAL COMPUTER PROGRAMS,
by R. W. Gehring, and C. H. Maines. 31 Dec 65.
106p. Contract N156-45330,
NAEC-ASL 1094-Vol-1
Unclassified report

See also AD-409 967.

Descriptors: (*Airframes, *Loading (Mechanics)), Simulation, Statics, Tests, Programming (Computers), Experimental design, Stabilization systems

The primary objective of this study was to further demonstrate the applicability of applied load ratios to full-size aircraft components for simulating elevated temperature static tests at room temperature. Plane-strain cross-section procedures are used for analytical definition of the applied load ratios in a similar manner to the original feasibility study performed with the use of simplified box beams. This study includes the experimental and analytical investigation of strength and deformation characteristics of several identical horizontal stabilizers in a room temperature environment as well as in various symmetrical and unsymmetrical steady-state elevated temperature environments. This study also includes the theoretical investigation into the feasibility of using applied load ratios when the mode of failure involves mechanical fasteners in critical splice joint areas. The main conclusion of this study is that although the analytical procedures for the two distinctly different modes of failure are somewhat different, deflection is the major parameter essential to simulation-factor or applied-load-ratio definition. (Author)

AD-631 660 Fld. 1/3, 11/6
CFSTI Prices: HC $6.60 MF $0.75
NORTH AMERICAN AVIATION INC COLUMBUS OHIO
APPLICATION OF APPLIED LOAD RATIO STATIC TEST SIMULATION TECHNIQUES TO FULL-SCALE STRUCTURES. VOLUME II. MATERIAL PROPERTIES STUDIES AND EVALUATION.
Engineering rept., vol-2,
by R. W. Gehring, and J. A. Lumm. 15 Jan 66.
68p. Contract N156-45330,
NAEC-ASL 1094-Vol-2
Unclassified report

See also AD-409 967.

Descriptors: (*Airframes, *Loading (Mechanics)), (*Structures, Loading (Mechanics)), Magnesium alloys, Aluminum alloys, Stainless steel, Steel, Stresses, Fastenings, Stabilizers (Horizontal tail surface), Tensile properties, Simulation, Failure (Mechanics), Deformation, Aerodynamic loading

Volume II contains the tensile program, tabulated data, derivation of Larson-Miller constants and parametric curves, and the relationships between actual stabilizer properties and the tensile coupon data for compatibility in the analytical-experimental phase of the program described in Volume IV. This study was performed on the two main structural materials of the horizontal stabilize , i.e., 7079-T6 aluminum alloy bare plate and AZ31B-H24 magnesium alloy. Data from other sources was used for 7075-T6, 4340 steel, and stainless steel, and were regarded as sufficiently accurate for the intended usage. Parametric curves with temperature-time exposure defined by the Larson-Miller Parameter are derived for 7079-T6 aluminum alloy where the primary problem is over-aging produced by the elevated temperature test conditions. The curves derived are useful for defining the tensile yield stress and tensile ultimate stress of 7079-T6 aluminum alloy in complex temperature-time environments. No parametric curves are shown for the AZ31B-H24 magnesium alloy since low initial room temperature properties and relative insensitivity to exposure time at elevated temperature prevent an accurate definition of the Larson-Miller constant for this material. (Author)

AD-631 662 Fld. 1/3
CFSTI Prices: HC $1.10 MF $0.50
NATIONAL AERO- AND ASTRONAUTICAL RESEARCH INST AMSTERDAM (NETHERLANDS)
RESEARCH ON STRUCTURAL FATIGUE TESTING.
Annual summary rept., no. 1, 15 Sep 60-14 Sep 61,
by J. Schijve. 10 Oct 61. 9p. Rept. no. MS-61-53,
Contract AF 61 (052)-439,
Unclassified report

Descriptors: (*Airplane panels, Structural properties), (*Wings, Stresses), Test equipment, Fatigue (Mechanics), Loading (Mechanics), Netherlands

The report deals with a research program for random-load and program fatigue tests. The scope of the investigation is to ascertain the validity of a load spectrum simplification procedure when applied to a structure representative of a modern aircraft design. For this purpose a number of F-27 wing center-section tension skins will be subjected to random-load and to program fatigue tests. The first phase of the program consists of the design and manufacture of a test rig for mounting the tension skins and of a hydraulic loading system with servo-apparatus to apply the desired ran-

dom and programmed load sequences. The first phase also includes static testing of the specimen in order to check the stress distribution in the tension skin. The report gives a brief description of the test set-up, the loading system, and the servo-apparatus. (Author)

AD-631 753 Fld. 1/3
CFSTI Prices: HC $16.30 MF $1.00
INSTITUT FUER SEGELFLUGFORSCHUNG FREIBURG IM BREISGAU (WEST GERMANY)
PRELIMINARY DESIGN AND DEVELOPMENT STUDY OF A PRESSURIZED SAILPLANE.
Technical rept. (final),
1955. 148p. Contract AF 61 (514)-825.
Unclassified report

Descriptors: (*Gliders, *Pressurized cabins), Design, Jet planes, Gas turbines, Jettisonable cockpits, Landing gear, Airframes, Costs, West Germany, Aircraft cabins, Aircraft heaters

The preliminary design of a sailplane with pressurized cabin is outlined to the following principles: (1) Light alloy construction by reason of stresses and low temperature conditions. (2) Auxiliary power plant to reach the operational altitude independent from towing aircraft and favourable weather conditions. (3) Development of an auxiliary turbine for driving the fresh air compressor, the generator and for heating resp. cooling the cabin. A compromise solution would be the installation of a windmill, which does not seriously affect the performances of the sailplane. In this case the cabin heating must be guaranteed by a thermite-coridon-mixture. (4) Retractable undercarriage combined with skid. (5) Jettisonable cabin with stabilizing parachute. (6) Double skin and perspex in the pressure cabin. (Author)

AD-631 777 Fld. 1/3, 1/1
CFSTI Prices: HC $4.00 MF $1.00
DEUTCHE FORSCHUNGSANSTALT FUER LUFT- UND RAUMFAHRT E V BRUNSWICK (WEST GERMANY) INSTITUT FUER FLUGMECHANIK
PARACHUTE CANOPIES DURING INFLATION.
Final rept.,
by H. D. Melzig, and P. K. Schmidt. Sep 65,
137p. Contract AF 61 (052)-681,
Unclassified report

Descriptors: (*Parachutes, Pressure), Aerodynamic characteristics, Experimental data, Surfaces, Photographic analysis, Tests, Mathematical models, Correlation techniques

An experimental investigation and correlative analysis were conducted to determine the pressure distribution over the surface of parachute canopies during the period of inflation for the infinite mass case and to correlate pressure coefficients with inflating canopy shapes. Parachute canopy models of Circular Flat, 10% Extended Skirt, Ringslot, and Ribbon designs were tested under infinite mass conditions in a 9 x 12 ft low speed wind tunnel. External and internal pressure values were measured at various locations over the surface of the model canopies throughout the period of inflation, and generalized canopy profile shapes were obtained by means of photographic analysis. Pressure coefficients derived for the steady state (fully open canopy) are quite comparable to the results of previous measurements. Peak pressure values during the unsteady period of inflation were found to be up to 5 times as great as steady state values. The relationships between the pressure distribution and time for each of the canopy models deployed at free-stream velocities between 70 and 160 ft/sec are presented in detail and correlated with changing canopy shape. A complete shape analysis is made and a mathematical model is proposed. (Author)

AD-631 331 See Fld. 4/2

AD-631 502 See Fld. 1/2

AD-631 727 See Fld. 5/1

1/4. AIRCRAFT FLIGHT INSTRUMENTATION

AD-631 633 Fld. 1/4
CFSTI Prices: HC $1.00 MF $0.50
INSTRUMENT PILOT INSTRUCTOR SCHOOL RANDOLPH AFB TEX
OPERATIONAL TEST AND EVALUATION OF UNFILTERED WHITE LIGHTED INSTRUMENTS.
Jan 66. 11p. Proj. TE-64-2.
Unclassified report

Descriptors: (*Flight instruments, Illumination), (*Instrument panels, Illumination), Light

The SAE Committee A-20 on aircraft lighting requested that the Air Force review the need for blue filtered white lighting because many manufacturers have had a difficult time meeting the present specifications. Nineteen pilots flew filtered and unfiltered panels in the T-38, and their preference was strongly in favor of the blue filtered white lighting. Accordingly, it is recommended that the blue filter be retained. (Author)

AD-631 663 Fld. 1/4, 9/2, 5/8
CFSTI Prices: HC $7.00 MF $1.75
LITTON SYSTEMS INC WOODLAND HILLS CALIF GUIDANCE AND CONTROL SYSTEMS DIV
COMPUTERS AND DISPLAYS/CONTROLS STATE-OF-THE-ART TECHNOLOGY STUDIES.
Rept. for 1 Jun 65-31 Jan 66,
by D. J. Pizzicara. Feb 66. 395p. Rept. no. Pub-4902,
Contract Nonr-4951 (00),
Unclassified report

Descriptors: (*Computers, Display systems), (*Display systems, *Flight instruments), (*Man-machine systems, Flight instruments), State-of-the-art reviews, Aeronautics, Flight control systems, Computer logic, Computer storage devices, Analog-to-digital converters, Cathode ray tubes, Scanning, Electron optics, Color television tubes, Digital computers, Analog computers, Electroluminescence

Computers and Displays/Controls for avionics systems are discussed primarily from a technology standpoint. The current state of the art is reviewed, current research developments are pointed out and prediction of when these developments will be incorporated into avionic systems is given. With respect to computers, the following major categories are assessed: a) Logic, b) Memory, c) Computer Organization, d) Analog/Digital Conversion. Emphasis is placed on the impact of batch fabrication to these areas. With respect to Displays/ Controls the following major categories are reviewed: a) CRT's, b) Scan Conversion, c) Color, d) Analog/Digital Techniques for range scaling and symbol generation, e) Electroluminescence. A summary chart projecting state of the art for computers and displays/controls to the 1975 period is presented at the end of the report. (Author)

1/5. AIR FACILITIES

AD-631 695 See Fld. 14/2

Field 2-AGRICULTURE

2/2. AGRICULTURAL ECONOMICS

AD-631 310 Fld. 2/2, 5/3
CFSTI Prices: HC $2.60 MF $0.50
RAND CORP SANTA MONICA CALIF
AGRICULTURAL LAND TENURE ARRANGEMENTS ON THE NORTHERN COAST OF PERU,
by Delbert A. Fitchett. Apr 66. 28p. Rept. no. P-3342.
Unclassified report

Descriptors: (*Agriculture, *Peru), Labor, Rural areas, Economics, Irrigation systems, Law

Two major categories in the tenure taxonomy are distinguished: active elements and passive elements. The former consist of those participants in man-land relationships who supply managerial ability, labor, and perhaps land and capital resources. The latter refer to those who contribute land and capital resources. The basic distinction is between the provision of human (labor and managerial ability) and non-human (land and capital) resources. Returns to unskilled human resources tend to be relatively low in the agricultural sector of this region. An improvement in the earnings of farm laborers can only come once the level of productivity of agricultural wage workers is raised by putting at their disposal training in and use of improved methods and tools. The minifundia (working as a part-time agricultural laborer) must be eliminated and the peasant farmer given access to information and stimulated and aided to utilize better seeds and planting practices, fertilizers, irrigation improvements, insecticides and provided proper facilities for marketing the increased output. A tenure structure which encourages or rests upon minifundia, whether owner or tenant operated, as appears to be the case on the North Coast, must be altered to remove these characteristics. Some of the major obstacles to increased levels of performance arise from the current distribution of returns to resource use or insecurity of sharing in the flow of increased returns owing to improvements in the level of performance.

AD-631 516 See Fld. 8/6

2/5. ANIMAL HUSBANDRY

AD-631 609 See Fld. 6/5

2/6. FORESTRY

AD-631 714 See Fld. 13/12

Field 3-ASTRONOMY AND ASTROPHYSICS

3/2. ASTROPHYSICS

AD-631 404 Fld. 3/2, 8/2
CFSTI Prices: HC $4.00 MF $0.75
AERONAUTICAL CHART AND INFORMATION CENTER ST LOUIS MO
COORDINATES OF LUNAR FEATURES, GROUP I AND II SOLUTIONS.
Technical paper,
by Donald L. Meyer, and Byron W. Ruffin. Mar 65. 101p. Rept. no. ACIC-TP-15,
Unclassified report

Descriptors: (*Moon, *Photogrammetry), (*Mapping, Moon), Extraterrestrial topography, Surveying, Photogeology, Site selection, Landing fields, Lunar probes, Maps

A series of one to one million scale charts of the moon and charts of potential landing sites are produced at the scale of one to five hundred thousand. Inadequacies of existing lunar control have necessitated the establishment of a new control program for measuring and reducing positions using earth based telescope photography. It is the purpose of this report to present the measurement and reduction methods employed and the lunar coordinates derived from the first two photo groups of a planned four photo group solution. (Author)

AD-631 601 Fld. 3/2, 20/10
CFSTI Prices: HC $7.55 MF $2.00
CALIFORNIA UNIV LOS ANGELES
TABLE OF HARTREE-FOCK SELF CONSISTENT FIELD WAVE FUNCTIONS WITH EXCHANGE, SUPPLEMENT II.
Scientific rept. for 1964-1965,
by Robert D. Chapman, and William H. Clarke.
Jan 66, 453p. Contract AF-AFOSR-83-65, Proj. AF-7114, ARL 66-0018
Unclassified report

See also AD-614 428.

Descriptors: (*Atomic spectroscopy, Astrophysics), (*Quantum mechanics, Astrophysics), (*Tables, Astrophysics), Electron transitions, Programming languages, Atomic energy levels, Wave functions

A table of Hartree-Fock self consistent field wave functions with exchange is presented for ions of the isoelectronic sequence Na I, . . . , Si IV. The configurations considered are 3s, 3p, 3d, 4s, . . ., 4f, 5s, . . ., 5g, 6s, . . ., 6h, 7s. (Author)

AD-631 658 Fld. 3/2
CFSTI Prices: HC $2.00 MF $0.50
DIRECTORATE OF SCIENTIFIC INFORMATION SERVICES OTTAWA (ONTARIO)
THE QUESTION OF THE TECTONIC ORIGIN OF LINEAR FORMATIONS ON MARS,
by G. N. Katterfeld. Apr 66, 27p. Rept. no. T-445-R, TT 66-61115
Unclassified report

Trans. of Vsesoyuznoe Geograficheskoe Obshchestvo. Izvestiya (USSR) v91 n3 p272-83 1959.

Descriptors: (*Mars (Planet), Terrain), (*Photogeology, Mars (Planet)), Mars probes, Photographs, Astronomical cameras, Spacecraft, Extraterrestrial topography, Structural geology, Linear systems

AD-631 659 Fld. 3/2
CFSTI Prices: HC $1.00 MF $0.50
DIRECTORATE OF SCIENTIFIC INFORMATION SERVICES OTTAWA (ONTARIO)
THE IRRELEVANCE OF BALDWIN'S RELATIONSHIP FOR DECIDING THE CAUSE OF LUNAR CRATER FORMATION,
by G. S. Shteinberg. Jan 66, 6p. Rept. no. T-446-R, TT 66-61116
Unclassified report

Trans. of Akademiya Nauk SSSR. Doklady, v165 n1 p55-7 1965.

Descriptors: (*Moon, Terrain), Cratering, Meteors, Volcanoes, Structural geology, Theory, Astrophysics

AD-631 697 Fld. 3/2
CFSTI Prices: HC $1.10 MF $0.50
TEXAS UNIV AUSTIN DEPT OF ASTRONOMY
A SPECTROPHOTOMETRIC ANALYSIS OF PROCYON.
Final rept.,
by Frank N. Edmonds,Jr.. Apr 66, 7p. Contract Nonr (G)-00049-64, Proj. NR-046-797,
Unclassified report

Descriptors: (*Stars, Spectroscopy), Hydrogen, Line spectrum, Atmosphere models, Astrophysics

AD-631 261 See Fld. 4/1

AD-631 375 See Fld. 20/10

AD-631 381 See Fld. 20/4

3/3. CELESTIAL MECHANICS

AD-631 566 See Fld. 22/3

Field 4-ATMOSPHERIC SCIENCES

4. ATMOSPHERIC SCIENCES

AD-631 510 Fld. 4, 8/14
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
AIRBORNE NIGHT AIRGLOW MEASUREMENTS IN THE SOUTH ATLANTIC MAGNETIC ANOMALY.
Environmental research papers (Revised ed.),
by Thomas P. Markham, and Robert E. Anctil.
15 Sep 65, 7p. Rept. no. AFCRL-ERP-178,AFCRL-66-175
Proj. AF-7661, Task 766101,
Unclassified report

Revision of manuscript submitted 28 Apr 65.

Availability: Published in Journal of Geophysical Research v71 n3 p997-9 Feb 1 1966. Copies to DDC users only.

Descriptors: (*Sky brightness, *Night sky), Terrestrial magnetism, Electron density, Protons, Luminescence, Research planes, Airborne, Photometers, Spectrum analyzers, Geophysics, Atlantic Ocean

Measurements of the night airglow 5577 A and 6300 OI lines were made in the South Atlantic Magnetic Anomaly from an Air Force KC-135 aircraft. The data does not show any intensity enhancement over that found outside the anomaly region. (Author)

4/1. ATMOSPHERIC PHYSICS

AD-631 246 Fld. 4/1
CFSTI Prices: HC $2.00 MF $0.50
AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C
SELECTED STUDIES OF ATMOSPHERICS.
ATD work Assignment no. 79, task 18,
by Daniel Wolkonsky. 25 Feb 66, 31p. Rept. no. ATD-66-21, TT 66-61047
Unclassified report

Trans. of Glavnaya Geofizicheskaya Observatoriya, Leningrad. Trudy (USSR) n177 p42-5, 55-8, 59-63, 64-5 1965. Rept. on Surveys of Soviet Scientific and Technical Literature.

Descriptors: (*Atmospherics, USSR), Geophysics, Meteorological phenomena, Radiofrequency interference, Wave analyzers, Wave functions

CONTENTS: Some characteristic features of the waveforms of distant atmospherics; Results of the registration of the waveforms of near atmospherics; Some results of an investigation of the atmospheric radio interference field in a wide frequency range; Amplitude-frequency and phase characteristics of very distant atmospherics; Amplitude-frequency spectra of near atmospherics.

AD-631 261 Fld. 4/1, 3/2, 20/8
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF PURE PHYSICS
SOLAR FLARE PARTICLES IN SEPTEMBER 1963,
by J. R. Burrows, I. B. McDiarmid, and Margaret D. Wilson. 1966, 18p.
NRC 8437
Unclassified report

Availability: Published in Reprint. Copies to DDC users only.

Descriptors: (*Solar flares, *Protons), (*Cosmic rays, Protons), Astrophysics, Space environmental conditions, Probes, Scientific satellites

Solar protons from flares in September 1963 were observed at an altitude of 1000 km by satellite instrumentation. A possible impact zone effect was measured 1 h after the 21 September flare. A differential spectrum dN/dE alpha E/3.2 is calculated. Latitude distribution and cut-off latitudes for selected proton energies from 1 to 165 MeV. are determined. Time variations and decays of proton fluxes from the 21 and 26 September flares are studied and relationships between the proton flux and cosmic noise absorption measurements, planetary magnetic index and possible interplanetary field configurations are discussed. (Author)

AD-631 273 Fld. 4/1, 9/6, 22/2
CFSTI Prices: HC $2.00 MF $0.50
AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C
TRANSMITTING SATELLITE PROPAGATION STUDIES: COMPILATION OF ABSTRACTS.
Rept. no. 1 on ATD work assignment no. 79, task 15.
15 Mar 66, 34p. Rept. no. ATD-66-24, TT 66-61049
Unclassified report

Rept. on Surveys of Soviet Scientific and Technical literature.

Descriptors: (*Space probes, Telemeter systems), (*Atmospheric sounding, *Telemeter systems), (*Satellites (Artifical), USSR), Space environmental conditions, Measurement, Scientific satellites, Instrumentation, Bibliographies

This compilation of abstraccts is based on Soviet-Satellite open sources published 1963-1965. It is the first in a series of reports reviewing Soviet developments in transmitting satellite propagation studies (cosmos satellite series). Information not directly related to the assigned subject has been included because of its broad implications for study in this field. The 23 abstracts are arranged alphabetically by author. Other data covered in this report: transistorized electrometric amplifier, geoactive particles, electrostatic analyzer, UHF dispersion interferometer, radiometric equipment. There are numerous tables and graphs. The bibliography at the end of the report includes 23 entries. (Author)

AD-631 345 Fld. 4/1, 8/14
CFSTI Prices: HC $3.60 MF $0.50
IOWA UNIV IOWA CITY DEPT OF PHYSICS AND ASTRONOMY
EXPLORER 12 OBSERVATIONS OF THE TEMPORAL VARIATIONS OF LOW-ENERGY ELECTRON INTENSITIES IN THE OUTER RADIATION ZONE DURING GEOMAGNETIC STORMS.
Progress rept.,
by L. A. Frank. Mar 66, 39p. Rept. no. U. of Iowa-66-8,
Contract Nonr-1509 (06) ,NSG-233-62
Unclassified report

Descriptors: (*Magnetic storms, *Space environmental conditions), (*Electron density, Space environmental conditions), Space probes, Atmospheric sounding, Scientific satellites, Instrumentation, Electrons, Intensity, Van Allen radiation belt

AD-631 410 Fld. 4/1
CFSTI Prices: HC $1.00 MF $0.50
HARVARD UNIV CAMBRIDGE MASS
LABORATORY STUDIES OF ATOMIC AND ELECTRONIC COLLISION PROCESSES RELEVANT TO THE STUDY OF THE UPPER ATMOSPHERE.
Final rept.,
by N. P. Carleton. 6 May 63, 25p. Contract AF 19 (628)-318, Proj. AF-7661, Task 76614, AFCRL 63-612

Unclassified report

See also AD-277 166.

Descriptors: (*Upper atmosphere, *Kinetic theory), Electrons, Molecules, Excitation, Oxygen, Nitrogen, Gas ionization, Geophysics, Photochemistry, Laboratories, Test methods, Spectroscopy

The work is divided into two major parts: (1) a study of electron-molecule and molecule-molecule collisions at energies of a few volts or less, with applications to atmospheric reactions; and (2) a study of ion-molecule and molecule-molecule collisions in the range of 200-2000 ev energy, with applications to meteor physics.

AD-631 470 Fld. 4/1, 22/2, 14/2
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
SIMULTANEOUS COMPARISON OF RF PROBE TECHNIQUES FOR DETERMINATION OF IONOSPHERIC ELECTRON DENSITY.
Environmental research papers, (revised ed.),
by K. D. Baker, A. M. Despain, and J. C. Ulwick. 8 Oct 65, 14p. Rept. no. AFCRL-ERP-180,AFCRL-66-184
Proj. AF-7663, Task 766307,

Unclassified report

Revision of manuscript submitted 20 May 65. Prepared in cooperation with Utah Univ., Salt Lake City, Upper Air Research Lab.

Availability: Published in Journal of Geophysical Research v71 n3 p935-44 Feb 1 1966. Copies to DDC users only.

Descriptors: (*Probes (Electromagnetic), *Atmospheric sounding), (*Ionosphere, *Electron density), Sounding rockets, Dipole antennas, Electrical impedance, Plasma physics, Resonant frequency

Three radio-frequency (RF) probe techniques--standing wave impedance probe, plasma frequency probe, and resonance rectification probe--have been simultaneously flown on rockets for ionospheric measurements. The results of the three proves are compared to establish the relationships among them. The impedance probe and plasma frequency probe measurements are in general agreement with each other and with other independent measurements. A model of antenna-ionospheric interaction is used that neglects ion sheath and magnetic field effects. The resonance rectification probe shows resonance effects including peaks and minimums that are a function of probe dc bias. The frequency of the dominant resonance peak does not correspond to the plasma frequency but is near a lower frequency of an impedance series resonance as measured by the plasma frequency probe. (Author)

AD-631 580 Fld. 4/1, 20/6
CFSTI Prices: HC $1.10 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
OBSERVATION OF CREPUSCULAR PEAK OF EMISSION OF HELIUM WAVELENGTH 10,830A WITH THE AID OF THE FABRY-PEROT STANDARD,
by P. V. Shcheglov. 23 Mar 66, 7p. Rept. no. FTD-TT-65-1635,
TT 66-61102

Unclassified report

Unedited rough draft trans. of mono. Mezhuvedomstvennyi Geofizicheskii Komitet. Rezultaty Issledovanii po Programme Mezhdunarodnogo Geofizicheskogo Goda. Polyarnye Siyaniya i Svechenie Nochnogo Neba, n.p. 1963 n9 p59-60.

Descriptors: (*Helium, *Line spectrum), (*Upper atmosphere, Helium), (*Twilight, Line spectrum), Spectrophotometers, Monochromic light, Emissivity, Sky, Interferometers, USSR

A description is given of a monochromator having unusually high transmission and of experiments involving use of the device to observe the helium 10,830 line in twilight.

AD-631 587 Fld. 4/1, 4/2
CFSTI Prices: HC $2.60 MF $0.50
RAND CORP SANTA MONICA CALIF
ON THE ROLE OF THE MESOPAUSE IN INTERACTION STUDIES,
by G. F. Schilling. Apr 66, 24p. Rept. no. P-3346,

Unclassified report

Descriptors: (*Atmosphere models, Correlation techniques), Boundary layer, Meteorological parameters, Atmosphere, Mathematical models, Atmosphere entry, Mathematical prediction, Digital computers

An earlier study emphasized that the understanding of interactions between thermosphere and mesosphere depends on quantitative knowledge of the physical processes taking place in the boundary layer, i.e., the mesopause. The present study demonstrates that the spatial and temporal behavior of mesosphere and lower thermosphere can indeed be depicted in a coherent way, consistent with empirical data, but only if these atmospheric regions are considered as separate entities. Attempts to derive quantitatively plausible connections between these two regions failed until it was assumed that the mesopause itself was not only a schematic boundary, but a region that exerts a dominant effect on the atmosphere above and below. (Author)

AD-631 606 Fld. 4/1
HARVARD UNIV CAMBRIDGE MASS
THE RELATION OF THE RECENT ATMOSPHERIC DUST MEASUREMENTS OF VOLZ AND GOODY TO THE PROBLEM OF METEORIC INFLUX,
by N. P. Carleton. 1 Aug 62, 4p. Contract AF 19 (628)-318,
AFCRL 412-63

Unclassified report

Prepared in cooperation with Smithsonian Astrophysical Observatory, Cambridge, Mass. See also AD-235 385, AD-268 455.

Availability: Published in Journal of the Atmospheric Sciences v19 n5 p424-6 Sep 1962.

Descriptors: (*Atmosphere, Dust), (*Meteors, Particles), (*Interstellar matter, Distribution), Velocity, Ionization, Zodiacal light

Speculation is made regarding the particles in the atmosphere with mass down to about 10 to the -11th gram. The particles are believed more numerous than might be expected by extrapolation from data obtained in meteor experiments. Furthermore, there is believed to be a concentration of such particles in the immediate neighborhood of the earth. Consideration is given to the datum of the measurements of Volz and Grady ('The intensity of the twilight and upper atmospheric dust.' J. Atmos. Sci., 19:351-68 (1962)) showing the presence of dust in the atmosphere up to about 65-km attitude. The contention is made that since the particles must be essentially in orbit about the earth, their contribution to the mass accretion is not overwhelming and any effects of ionization or excitation are negligible.

AD-631 801 Fld. 4/1, 20/8
CFSTI Prices: HC $6.00 MF $1.25
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
CONFERENCE ON THE EARTH'S ALBEDO NEUTRON FLUX, OCTOBER 15-16, 1963,
by D. J. Williams, and C. O. Bostrom. 16 Oct 63, 221p. Rept. no. TG-543,
Contract NOw-62-0604-c,

Unclassified report

Descriptors: (*Albedo, Neutrons), (*Neutrons, *Cosmic rays), (*Space environmental conditions, Neutrons), Symposia, Van Allen radiation belt, Protons, Life expectancy, Solar radiation, Fast neutrons, Atmosphere, Atmospheric sounding, Earth (Planet), Neutron flux, Neutron detectors, Scientific satellites, Astrophysics, Geophysics

Contents: Neutron conference attendees; What determines the lifetime of trapped protons; The cosmic-ray neutron leakage flux; Neutron albedo and charged particle measurements on polar orbiting satellites; Measurement of albedo neutron latitude variation from a polar orbiting satellite; Albedo neutrons in space; Neutrons from the sun; Fast neutrons in the earth's atmosphere: Variation with depth and time variations at high altitudes; Atmospheric neutron flux measurements; Latitude survey of cosmic-ray intensity by Explorer 7, October 1959 to February 1961; Panel discussion on neutron detection.

AD-631 227 See Fld. 20/14

AD-631 268 See Fld. 9/6

AD-631 276 See Fld. 9/6

AD-631 411 See Fld. 5/1

AD-631 427 See Fld. 17/8

AD-631 482 See Fld. 7/4

AD-631 485 See Fld. 7/4

AD-631 605 See Fld. 7/4

AD-631 607 See Fld. 7/4

AD-631 608 See Fld. 7/4

4/2. METEOROLOGY

AD-631 245 Fld. 4/2, 19/1, 15/7
CFSTI Prices: HC $1.60 MF $0.50
BALLISTIC RESEARCH LABS ABERDEEN PROVING GROUND MD
FEASIBILITY TEST OF A POTENTIAL METEOROLOGICAL SHELL FOR THE STANDARD 175 MM GUN.
Technical note,
by John A. Brown, and Spence T. Marks. Feb 66, 19p. Rept. no. TN-1584,
Proj. RDT/E-1V014501B53C

Unclassified report

Descriptors: (*Atmospheric sounding, *Artillery units), (*Meteorological instruments, Gun launched), (*Projectiles, Atmospheric sounding), Meteorological parameters, Probes, Howitzers, Weather forecasting, Military requirements, Meteorology, Ballistics

The acquisition of timely meteorological data has a great bearing on the accuracy of placement of artillery rounds. This report describes the results of a program which was conducted by the Ballistic Research Laboratories (BRL) at the NASA Wallops Island facility to determine the feasibility of employing the standard 175 mm gun and a modified shell to obtain meteorological data quickly. (Author)

AD-631 331 Fld. 4/2, 1/3
CFSTI Prices: HC $1.60 MF $0.50
SCHJELDAHL (G T) CO NORTHFIELD MINN
SKYHOOK FLIN FLON 1965.
Final rept., Mar-Sep 65,
by Clifton P. Merrell. Apr 66, 20p. Contract Nonr-4859 (00), Proj. NR-211-098 ,RO-001-01
Unclassified report

Descriptors: (*Meteorological balloons, *Atmospheric sounding), X rays, Solar radiation, Radiation measurement systems, Balloon equipment, Telemeter systems, Flight paths, Upper atmosphere, Tracking, Launching, Ground support equipment, Manitoba

Skyhook balloon flight operations from the Flin Flon, Manitoba area are reported. The program is described, flight results are presented, and recommendations are made for further studies under this program. (Author)

AD-631 415 Fld. 4/2
CFSTI Prices: HC $4.00 MF $0.75
WEATHER BUREAU WASHINGTON D C
SOME CLIMATIC FEATURES OF THE NORTHWESTERN SLOPE OF THE GREENLAND ICE CAP (EAST OF THULE).
Final rept., 15 Sep 64-15 Mar 65,
by Nina A. Stepanova, and P. Putnins. 15 Mar 65, 110p. Proj. DA-1V0-14501-B-53A-05,
Unclassified report

Sponsored in part by U. S. Army Electronics Command, Fort Monmouth, New Jersey.

Descriptors: (*Climatology, *Greenland), Atmospheric temperature, Wind, Cloud cover, Meteorology, Data, Graphics, Glaciers, Ice islands, Arctic regions

The climatic observations at three stations along the slope and at one station at the edge of the ice cap, east from Thule, were evaluated. The following elements were analyzed: Temperature: Annual and diurnal course of temperature, extreme temperatures, aperiodic fluctuation of temperature (also a case of strong warming along the slope was investigated), temperature lapse rates along the NW and SW slopes of the Greenland ice cap; Wind regime: Frequencies of wind directions, mean wind speed, maximum wind speed. Cloudiness: Annual and diurnal variation of cloudiness, frequencies of clear and overcast sky, diurnal range of cloudiness; a case of sudden extreme change of cloudiness was analyzed. (Author)

AD-631 462 Fld. 4/2
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
SOME INFERENCES ABOUT THE UPDRAFT WITHIN A SEVERE LOCAL STORM.
Environmental research papers, (revised ed.),
by Keith A. Browning. 2 Aug 65, 13p. Rept. no. AFCRL-ERP-175 ,AFCRL-66-155
Proj. AF-6672, Task 667205,
Unclassified report

Revision of manuscript submitted 25 Jan 65.

Availability: Published in Journal of Atmospheric Sciences v22 n6 p669-77 Nov 1965. Copies to DDC users only.

Descriptors: (*Storms, *Convection (Atmospheric)), Radar echo areas, Air mass analysis, Tropopause, Radar scanning, Meteorological charts, Meteorology

Various features of the radar echo from a severe local storm are interpreted with the purpose of defining the nature of its updraft. The analysis illustrates the methodology of using conventional radar data to study airflow and also confirms a number of important features of an airflow model previously proposed by the author (1964). For example, it is confirmed that an updraft was present within, and was largely responsible for, the radar vault. The updraft within the vault was inclined upward with a component toward the storm's left flank below the level of the tropopause and in the reverse sense at higher levels. A novel feature of this analysis is that shafts of precipitation descending from neighboring storms are shown to have been drawn toward, and upward within, the vault. A study of the shape of these shafts of precipitation has permitted inferences to be made concerning the nature of the inflow toward the updraft. (Author)

AD-631 463 Fld. 4/2
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
THE EVOLUTION OF TORNADIC STORMS.
Environmental research papers,
by Keith A. Browning. 6 Jul 65, 10p. Rept. no. AFCRL-ERP-174 ,AFCRL-66-151
Proj. AF-6672, Task 667205,
Unclassified report

Availability: Published in Journal of Atmospheric Sciences v22 n6 p664-8 Nov 1965. Copies to DDC users only.

Descriptors: (*Storms, *Air mass analysis), Hail, Convection (Atmospheric), Radar echo areas, Meteorological charts, Meteorology

A life cycle classification for severe local storms is proposed, which adds a fourth stage, the quasi-steady SR Mature Stage, to the well-known Byers-Braham classification. A combined analysis of the surface weather and radar echoes from three neighboring severe local storms reveals that each storm went through a similar, well-defined metamorphosis at the onset of its SR Mature Stage. The distinctive character of this stage is attributed to the rotational properties of the updraft, which in the storms studied developed when the updrafts had become vigorous enough to produce giant hail. (Author)

AD-631 490 Fld. 4/2
CFSTI Prices: HC $4.00 MF $0.75
INTERMOUNTAIN WEATHER INC SALT LAKE CITY UTAH
THE INFLUENCE OF ATMOSPHERIC CONSTITUENTS UPON LONG WAVE RADIATION IN CONJUNCTION WITH THE FORMATION OF RADIATION FOG.
Final rept., 1 Jun 64-31 Mar 66,
by Wilford Zdunkowski. Apr 66, 104p. Contract DA-28-043-AMC-00122 (E), Proj. DA-1V0-14501-B-53A-04-05,
ECOM 00122-F
Unclassified report

Descriptors: (*Fog, *Micrometeorology), Soils, Surface temperatures, Radiation (Heat transfer), Water vapor, Humidity, Haze, Atmospheric condensation, Atmosphere models, Meteorological parameters, Mathematical models

This project deals with the prediction and maintenance of radiation fog. A system of physical equations, modelling the atmospheric boundary layer, is solved by numerical means. Temperature changes in fog-free air and within fog are discussed. The significance of soil parameters and exchange coefficients is studied systematically and shortcomings of the classical theory are pointed out. (Author)

AD-631 503 Fld. 4/2, 8/12
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
THE LOBE STRUCTURE OF GIANT HAILSTONES.
Revised ed., Environmental research papers,
by K. A. Browning. 30 Jul 65, 25p. Rept. no. AFCRL-ERP-182,AFCRL-66-191
Proj. 6672, Task 667205,
Unclassified report

Revision of manuscript submitted 16 Feb 65.

Availability: Published in Quarterly Journal of the Royal Meteorological Society v92 n391 p1-14 Jan 1966. Copies to DDC users only.

Descriptors: (*Hail, Crystal structure), Phase studies, Bubbles, Crystal growth, Ice, Crystallography, Photographic analysis

Photographs on thin sections through five giant hailstones are presented to portray their bubble and crystal structures. These are interpreted to show that the hailstones grew as three-dimensional arrays of almost completely frozen lobes, sometimes but not always separated by regions of spongy ice characterized by radial lines of bubbles. (Author)

AD-631 509 Fld. 4/2, 22/2, 15/7
CFSTI Prices: HC $1.60 MF $0.50
ARACON GEOPHYSICS CO CONCORD MASS
METEOROLOGICAL SATELLITE TECHNIQUES FOR THE ARMY.
Quarterly rept. no. 3, 1 Nov 65-31 Jan 66,
by P. E. Sherr, C. W. C. Rogers, and J. C. Barnes. Mar 66, 15p. Rept. no. 9G21-10,
Contract DA-28-043-AMC-01273 (E), Proj. DA-1VO-25001-A-126-01,
ECOM 01273-3
Unclassified report

See also AD-627 442.

Descriptors: (*Meteorological satellites, Army research), (*Weather forecasting, *Army operations), Weather communications, Military personnel, Military training, Meteorology, Handbooks

The research was reported herein conducted during the third quarter of a contractual investigation was aimed at providing Army field units with techniques for the use of weather satellite data. Results to date for each of several tasks are discussed. These include: (1) mesoscale analysis and interpretation studies; (2) analysis of Army requirements for applications of weather satellite data; (3) case studies of World War II, Korean or U. S. field maneuver synoptic situations, using analogs for which satellite data are available; (4) investigations of methods for determining weather affecting enemy operations; (5) procedures for field use of meteorological satellite data; and (6) operational guide preparation. The research, and draft chapters of the final report, have been completed for many Tasks. For these Tasks, only a summary statement of principal results is included here. More comprehensive discussions of these completed Tasks can be found in Reports (AD-623 532, AD-627 442), and will be included in the forthcoming final report and operational guide being prepared under this contract. Brief discussions of the yet uncompleted Tasks are provided here. (Author)

AD-631 553 Fld. 4/2, 13/2
CFSTI Prices: HC $5.00 MF $1.00
ALASKA UNIV COLLEGE GEOPHYSICAL INST
ICE FOG: LOW TEMPERATURE AIR POLLUTION DEFINED WITH FAIRBANKS, ALASKA AS TYPE LOCALITY,
by Carl S. Benson. Nov 65, 195p. Rept. no. UAG-R-173,
Contract DA-ENG-11-190-61-G3 ,DA-ENG-27-021-62-G5
Unclassified report

Descriptors: (*Ice fog, Alaska), (*Air pollution, Alaska), Ice, Crystal growth, Meteorology, Supercooling, Radiation (Heat transfer)

Stable pressure systems over interior Alaska sometimes produce prolonged, extreme (below -40C) cold spells at the surface. The meteorological conditions responsible for two such cold spells are discussed in detail, where it is shown that the rate of radiative cooling of the air is enhanced by suspended ice crystals which are themselves a result of the initial cooling. Radiation fogs formed

during the onset of cold spells are generally of short duration because the air soon becomes desiccated. These fogs consist of supercooled water droplets until the air temperature goes below the 'spontaneous freezing point' for water droplets (about -40C); the fog then becomes an ice crystal fog, or simply 'Ice Fog'. During the cooling cycle water is gradually condensed out of the air until the droplets freeze. At this point there is a sharp, discontinuous decrease in the saturation vapor pressure of the air because it must be reckoned over ice rather than over water. The polluted air over Fairbanks allows droplets to begin freezing at the relatively high temperature of -35C. Between -35 and -40C the amount of water vapor condensed by freezing of supercooled water droplets is 3 to 5 times greater than the amount condensed by 1C of cooling at these temperatures. This results in rapid and widespread formation of ice fog which persists in the Fairbanks area as long as the cold spell lasts. The persistence of Fairbanks ice fog depends on a continual source of moisture (4.1 x 1,000,000 Kg H2O per day) from human activities within the fog. (Author)

AD-631 558 Fld. 4/2, 16/1
CFSTI Prices: HC $2.60 MF $0.50
ATMOSPHERIC SCIENCES LAB WHITE SANDS MISSILE RANGE N MEX
WHITE SANDS MISSILE RANGE CLIMATE CALENDAR,
by Paul H. Taft. Apr 66, 30p. Task DA-1V650212A27-02,
ECOM 5041
Unclassified report

Descriptors: (*Guided missile ranges, New Mexico), (*Climatology, New Mexico), Meteorological parameters, Tables

Mean daily maximum and minimum temperatures and extreme temperatures for the period of record (1950-1965) are tabulated in calendar form for the weather station located at Headquarters, White Sands Missile Range, New Mexico. Averages of temperature, relative humidity, precipitation, wind and cloudiness are included for each month, as well as extremes of monthly and 24-hour rain-fall. Supplementary tables give monthly, seasonal and annual values of maximum winds, degree days, number of days with occurrence of thunderstorms and visibility restrictions, means and extremes of station pressure, and average 6-hourly relative humidity. Weekly means of maximum and minimum temperatures and weekly values of precipitation are also presented, in graph form, as well as a summary of weather extremes for the State of New Mexico. (Author)

AD-631 696 Fld. 4/2
CFSTI Prices: HC $3.00 MF $0.75
RAVEN INDUSTRIES INC SIOUX FALLS S DAK
HAIL INCIDENCE IN THE TROPICS.
Final rept.,
by E. M. Frisby, and H. W. Sansom. Sep 66, 55p. Rept. no. 0766,
Contract DA-28-043-AMC-02105 (E)
ECOM 02105-F
Unclassified report

Prepared in cooperation with Central Services, East African Meteorological Dept., Nairobi, Kenya.

Descriptors: (*Hail, Tropical regions), (*Climatology, Tropical regions), Meteorology, Atmospheric precipitation, Ice, Tables, West Indies, Mexico, Central America, South America, Africa, Arabia, Indonesia, Southeast Asia, Pacific Ocean Islands, Australia

This report is a review and compilation of information concerning the incidence and frequency of hail fall in tropical areas. The authors have gathered the data over a period of years from literary sources and by extensive correspondence with private individuals and Government Meteorological Services. The four areas under which the various hail reports are grouped viz. the American, African, Asian and Pacific, and Australian, together form a total band around the equator within latitudes 23 1/2 degrees north and south of it. Attempts have been made to systematise presentation of the information. This is only possible up to a point however, since it was received in a multiplicity of forms, some of which defy conventional climatological handling. Nevertheless the Report makes possible for the first time a comprehensive assessment of the tropical hail phenomenon. Moreover a great deal can be learned from it about seasonality of hail fall in specific areas and about the occurrence of hail at sea level and over the sea, facts which have been in question up to this time. (Author)

AD-631 790 Fld. 4/2, 9/6, 9/2
CFSTI Prices: HC $3.00 MF $0.75
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
COMPUTER PROCESSING OF MESOSCALE RAWINSONDE DATA FROM PROJECT STORMY SPRING.
Special repts.,
by Carl W. Kreitzberg, and William E. Brockman. Feb 66, 100p. Rept. no. AFCRL-SR-41,AFCRL-66-97
Proj. AF-6698, Task 669802,
Unclassified report

Prepared in cooperation with Dayton Univ., Ohio. Research Inst.

Descriptors: (*Radiosondes, Data processing systems), (*Atmospheric sounding, *Digital computers), (*Telemeter systems, Radiosondes), Weather forecasting, Meteorological parameters, Telemetering data, Programming (Computers)

This report documents the data reduction procedures used for processing the mesoscale rawinsonde data obtained during Project Stormy Spring. Temperature and humidity data at each pressure contact (about each half-minute) and azimuth and elevation data at either two or ten times per minute were entered on punched cards. The 50-mb layer data for a series of soundings at one station were computed and used in another program to compute local time derivatives and single-station thermodynamic vertical velocities. Data at numerous isobaric and isentropic levels were obtained by interpolation. Data output took a variety of forms including: listings of soundings, time sections, isobaric and isentropic plane sections, mechanical plots of soundings of Skew-T log P diagrams, time traces, punched cards, and magnetic tapes. (Author)

AD-631 797 Fld. 4/2
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
AN ANALYSIS OF VERTICAL SCALE STRUCTURE AND WIND SHEAR IN THE MESOSPHERE FROM FALLING SPHERE DATA.
Environmental research papers (Revised ed.),
by Bernhard Lettau. 18 Nov 65, 12p. Rept. no. AFCRL-ERP-183
Proj. AF-8624, Task 862401,
Unclassified report

Revision of manuscript received 16 Aug. 65.

Availability: Published in Journal of Geophysical Research v71 n4 p1003-10 Feb 15 1966. Copies to DDC users only.

Descriptors: (*Wind, *Upper atmosphere), (*Atmosphere sounding, Wind), Falling bodies, Balloons, Atmospheric motion, Mapping

Small-scale features in four wind profiles obtained from falling sphere measurements at Ascension Island are examined with respect to wave structure in the altitude interval from 50 to 65 km, a region of temperature lapse with height. An objective method of defining the predominant wavelength in the profiles in this altitude interval is presented, and it is found that for all profiles the defined length in the component transverse to the mean motion exceeds that of the component along the mean motion. Corresponding wind shear values show no similar component difference. The vertical scale of the observed features appears to be independent of the underlying surface relief. (Author)

AD-631 411 See Fld. 5/1

AD-631 587 See Fld. 4/1

AD-631 687 See Fld. 8/10

AD-631 718 See Fld. 8/12

Field 5-BEHAVIORAL AND SOCIAL SCIENCES

5/1. ADMINISTRATION AND MANAGEMENT

AD-631 411 Fld. 5/1, 4/1, 20/14, 22/1, +
CFSTI Prices: HC $7.00 MF $1.50
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
REPORT ON RESEARCH AT AFCRL, JULY 1963-JUNE 1965.
Sep 65, 319p. Rept. no. AFCRL-65-595,
Unclassified report

See also AD-602 165.

Descriptors: (*Air force research, Reports), Upper atmosphere, Microwaves, Antennas, Astrophysics, Geodesy, Geology, Optics, Data processing systems, Meteorology, Solid state physics, Astronautics, Instrumentation, Scientific research

Summaries are given of research in the following fields: upper atmosphere physics, microwave physics, space physics, terrestrial sciences, optical physics, data sciences, meteorology, solid state, aerospace instrumentation.

AD-631 429 Fld. 5/1, 9/2, 7/2, 6/19, +
CFSTI Prices: HC $3.00 MF $0.75
AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C
FOREIGN SCIENCE BULLETIN, VOL. 2, NO. 4.
Apr 66, 82p.
TT 66-61085
Unclassified report

A monthly review of selected foreign scientific and technical literature sponsored by the Department of Defense. See also AD-630 191.

Descriptors: (*Scientific research, Reviews), (*Nervous system, Excitation), (*Ferrites, Computer storage devices), (*Space flight, Biology), (*Rare earth compounds, Chalcogens), (*Cavitation, Scientific research), Mathematical models, Analog computers, Bionics, Semiconductors, Propellers (Marine), Hydrofoils, Magnetic fields, Lightning, Radio waves, Propagation, Hall effect, Magnetometers, Cybernetics, Seismology, Oceanology, USSR

Contents: Mathematical model of excitation of a neural network and analysis of its properties by means of an analog computer; developments in ferrite memories; biological experiments on Kosmos-110; new research data on the chalcogenides of rare earth elements; cavitation effect and properties; science and technology notes; conferences; science personalities; aleksandr Naumovich Frumkin.

AD-631 712 Fld. 5/1, 14/2, 20/3, 9/3, +
CFSTI Prices: HC $4.00 MF $1.00
ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB
PROGRESS REPORT FOR DEC., 1965, JAN. AND FEB., 1966.
Quarterly progress rept., 1 Dec 65-28 Feb 66.
1 Apr 66, 145p. Contract DA-28-043-AMC-00073 (E), Proj. DA-20014501B31F
Unclassified report

See also AD-627 094.

Descriptors: (*Scientific research, Reports), Laboratories, Physics, Ionosphere, Surface properties, Computers, Control systems, Bubble chambers, Teaching machines, Vacuum apparatus, Plasma physics, Superconductivity, Films, Voltage, Switching networks, Networks, Communication systems

AD-631 727 Fld. 5/1, 5/11, 1/3, 20/4, +
CFSTI Prices: HC $5.00 MF $1.00
OFFICE OF AEROSPACE RESEARCH WASHINGTON D C
PROCEEDINGS OF THE OAR RESEARCH APPLICATIONS CONFERENCE HELD AT THE STATE DEPARTMENT, WASHINGTON, D. C., 5 APRIL 1966.
1966, 182p.
Unclassified report

Descriptors: (*Symposia, *Air force research), Compressors, Supersonic flow, Optimization, Trajectory, Control systems, Boundary layer, Particles, Separation, Turbines, Reports, Photometers, Spectrum signatures, Satellites (Artificial), Ceramic materials, Dispersion hardening, Molecular beams, Boron, Filaments, Crystal structure, Gyroscopes, Nuclear physics, Superconductors, Magnetic fields

Contents: a computational procedure for optimum trajectory and optimal control problems, boundary layer studies-practical implications, supersonic compressor research, the arl inertial particle separator for military turbine powered vehicles, photoelectric photometry-a new tool for satellite signatures, precipitation in ceramics, molecular beams, the control of unstable mechanical systems, the determination of the structure of boron in 'amorphous' boron filaments, an extremely low-drift nuclear gyro from quantized flux to a free precession nuclear gyro.

AD-631 755 Fld. 5/1, 12/1, 13/8
NEW YORK UNIV N Y DEPT OF INDUSTRIAL ENGINEERING AND OPERATIONS RESEARCH
DESIGN PROBLEMS IN A PROCESS CONTROL SIMULATION,
by Norbert Hauser, Norman N. Barish, and SylvainEhrenfeld. 1964, 8p. Contract DA-ARO (D)-31-124-G371 ,DA-ARO (D)-31-124-G475 AROD 3133:5
Unclassified report

Availability: Published in The Journal of Industrial Engineering v17 n2 p79-86 Feb 1966. Copies to DDC users only.

Descriptors: (*Management control systems, Simulation), Design, Stochastic processes, Computers, Automation, Decision making, Monte Carlo method, Statistical analysis, Decision theory, Analysis of variance, Quality control

The article is concerned with the study of methods and problems relating to the simulation of the stochastic output of a process control simulation. Aspects which are treated include questions of efficiency and stopping rules for deciding on the length of simulation run to achieve a desired confidence level for estimates. Some of the problems of computer computation are considered, and methods for solving them are suggested. (Author)

AD-631 699 See Fld. 16/4

5/2. DOCUMENTATION AND INFORMATION TECHNOLOGY

AD-631 241 Fld. 5/2, 5/7
CFSTI Prices: HC $6.00 MF $1.25
LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF ELECTRONIC SCIENCES LAB
AUTOMATIC INDEXING AND ABSTRACTING, PART I.
Annual progress rept.,
by B. D. Rudin. Mar 66, 214p. Rept. no. M-21-66-1-Pt-1,
Contract Nonr-4440 (00),
Unclassified report

See also AD-615 424.

Descriptors: (*Subject indexing, Automatic), (*Abstracts, Processing), (*English language, Analysis), Syntax, Phonetics, Speech, Algorithms, Dictionaries

The report consists of 8 papers. The first four papers are concerned with the relationship between the part of speech of words and their graphic form. An operational definition of affixes is given, the usefulness of affixes in the automatic determination of parts of speech is discussed, and an algorithm is outlined for determining parts of speech with a dictionary look-up of less than 200 affixes and less than 800 words. The inflection of adjectives is also discussed, anticipating the need for future refinement of the part-of-speech algorithm, which at present identifies 11 part-of-speech categories. The fifth paper is a progress report on the development of a method for automatic indexing without reference to any pre-prepared dictionary, thesaurus, etc. It shows the current results on five text excerpts. The final three papers are concerned with the relationship between English phonetics and English morphology. One of the papers is concerned with homonyms, which represent a problem area in transformation from phonetic to graphic English. Another discusses a function for mapping written English into spoken English, and the third describes a computerized study of transcribed English phonetics as given by different dictionaries. (Author)

AD-631 242 Fld. 5/2, 5/7
CFSTI Prices: HC $3.00 MF $0.75
LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF ELECTRONIC SCIENCES LAB
AUTOMATIC INDEXING AND ABSTRACTING. PART II. ENGLISH INDEXING OF RUSSIAN TECHNICAL TEXT.
Annual progress rept.,
by B. D. Rudin. Mar 66, 72p. Rept. no. M-21-66-2-Pt-2,
Contract Nonr-4440 (00)
Unclassified report

Descriptors: (*Russian language, Subject indexing), (*Machine translation, Russian language), Dictionaries, Computers, Algorithms, Information retrieval

The report describes a computer system for the IBM 7094 which produces English indexes of technical Russian text. Part of the indexing system produces a machine dictionary on magnetic tape. This dictionary is a computer representation of standard English-Russian phrase technical dictionaries. A machine dictionary must exist for the same field as the text being indexed. The indexing portion of the system operates upon the machine dictionary. Russian text phrases are matched against Russian dictionary phrases. When a match is found, the English translation is extracted from the dictionary. The final index is constructed from the set of such English translations. The Russian dictionary entries are in canonical form. The indexing system contains reverse inflection algorithms which transform text phrases to their canonical forms. (Author)

AD-631 624 Fld. 5/2
CFSTI Prices: HC $1.00 MF $0.50
APPLIED MECHANICS REVIEWS SAN ANTONIO TEX
CRITICAL ABSTRACTS,
by Stephen Juhasz, and Ottilie Amminger. Feb 66, 23p. Rept. no. AMR-43,
Contract AF-AFOSR-33-64, Proj. AF-9769, Task 976901,
AFOSR 66-0642
Unclassified report

Prepared for presentation at the Institute of Information Storage and Retrieval (7th annual), The American University, 1965, Washington, D. C. Prepared in cooperation with Southwest Research Inst., San Antonio, Texas.

Descriptors: (*Abstracts, Processing), Periodicals

A brief history of critical abstracts is given. The meaning of the words 'critical'? 'evaluative', 'abstract' and 'review' is discussed. The media of critical abstracts are outlined. Purpose and organization of critical abstracts are examined. The set-up of the editorial operation of a critical abstract journal such as AMR is described. APPLIED MECHANICS REVIEWS scans 900 technical magazines and relies on the voluntary help of 1500 expert critical abstractors in 30 countries. Even with extensive use of data processing and computers in the future the critical abstractor (reviewer) will remain the key of the operation, but the time lag will be radically reduced. Reviewer invitation, motivation and assignment are discussed, and how APPLIED MECHANICS REVIEWS evaluates the critical abstracts. (Author)

AD-631 748 Fld. 5/2, 9/2, 5/7
CFSTI Prices: HC $3.00 MF $0.75
HEBREW UNIV JERUSALEM (ISRAEL)
DATA RETRIEVAL BY COMPUTER. A CRITICAL SURVEY.
Technical rept.,
by Asa Kasher. Jan 66, 78p. Rept. no. TR-22,
Contract N62558-4695, Proj. NR-049-130/6,
Unclassified report

See also PB-161 547.

Descriptors: (*Information retrieval, State-of-the-art reviews), (*Data, Information retrieval), Computers, Artificial intelligence, Computational linguistics, Context free grammars, Data processing systems, Programming languages, Context sensitive grammars, Israel

The report constitutes a critical survey of work in the field of data-retrieval from a theoretical viewpoint. The conditions to be fulfilled, ideally, by a data-retrieval system which distinguish it from other types of data-processing systems are enumerated. Section 1 deals with problems of sentence ambiguity, syntactic and/or semantic, with special reference to context-dependence. Various fallacies and misconceptions are pointed out. Section 2 is devoted to the question of data-based versus text-based systems. Sections 3 and 4 discuss the ambivalent attitude to various theoretical results. Examples: Questions of consistency, decidability, syntactic simplification, inadequate explication. Various attempts to overcome these difficulties are described, and their respective merits and defects discussed. Section 5 deals with the fallacious identification of 'conversation' and 'cross-examination', which is traced back to a misunderstanding of a classical paper of Turing. Section 6 digresses, to discuss systems having a two-dimensional input. Section 7 points out the fallacy of indiscriminate application of considerations of efficiency, etc., which are in general not accompanied by careful analysis of the specific systems in question. The conclusion asserts the need to concentrate research on less ambitious lines than hitherto. (Author)

AD-631 396 See Fld. 9/2

5/3. ECONOMICS

AD-631 736 Fld. 5/3, 5/4, 12/2
CFSTI Prices: HC $2.00 MF $0.50
PRINCETON UNIV N J ECONOMETRIC RESEARCH PROGRAM
GAME THEORY AND HUMAN CONFLICTS.
Research memo.,
by Klaus-Peter Heiss. Mar 66, 38p. Rept. no. RM-80,
Contract Nonr-1858 (16), Proj. NR-047 086,
Unclassified report

Descriptors: (*Game theory, *Social sciences), Minimax technique, Economics, Sociology, Political science, Reviews

Review of Bruno de Finetti's article 'La teoria dei Giochi' (1963) and comments on the history of game theory, the role of minimax theorem in zero sum games and non-zero sum games, its implications for the solution of social conflicts as seen by de Finetti. (Author)

AD-631 310 **See Fld. 2/2**

AD-631 464 **See Fld. 13/10**

AD-631 516 **See Fld. 8/6**

5/4. HISTORY, LAW AND POLITICAL SCIENCE

AD-631 584 Fld. 5/4
CFSTI Prices: HC $2.00 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
DOCUMENTS FOR HISTORY.
11 Mar 66, 41p. Rept. no. FTD-TT-66-11, TT 66-61105
Unclassified report

Unedited rough draft trans. of Habana (Cuba) n5 p82-7 1958.

Descriptors: (*Cuba, *History)

Translation of letter by Fidel Castro on Dec. 14, 1957 to the Cuban Liberation Committee in which he explains his reasons and motives for separating from the Committee. The letter is addressed to the directors of the Cuban Revolutionary Party, Party of the Cuban People, Authentic Organization, University Student Federation, Revolutionary Directorate, and Revolutionary Labor Directorate. There is also a translation of the reply by Faure Chaumon, of the Revolutionary Directorate, to the declaration of Fidel Castro.

AD-631 192 **See Fld. 12/1**

AD-631 736 **See Fld. 5/3**

5/5. HUMAN FACTORS ENGINEERING

AD-631 476 Fld. 5/5
CFSTI Prices: HC $2.00 MF $0.50
AEROSPACE MEDICAL RESEARCH LABS WRIGHT-PATTERSON AFB OHIO
VOLUMETRIC WORKSPACE STUDY. PART II. OPTIMUM WORKSPACE CONFIGURATION FOR USE OF WRENCHES.
Final rept.,
by William N. Kama. Dec 65, 29p. Rept. no. AMRL-TDR-63-68Vol-2,
Proj. AF-7184, Task 718406,
Unclassified report

See also AD-420 353.

Descriptors: (*Human engineering, Job analysis), (*Job analysis, Time studies), (*Wrenches, Job analysis), Industrial research, Volume, Configuration, Maintenance, Performance tests

The study was conducted to establish the functional relationship between available workspace and the time required to remove and to replace two self-locking hexagonal nuts. The experiment involved the following variables: (a) wrench type, a 6-inch long open-end or 7-inch long ratchet; (b) workspace depth, 15, 30, and 45 cm (6, 12, and 18 inches); (c) aperture size, 20, 25, 30, 35, and 40 cm (8, 10, 12, 14, and 16 inches); and (d) task location within the workspace (left side, right side, top, bottom, or rear). Twenty-one subjects were divided into three groups of seven subjects each. For a given group, depth was held constant as subjects using their right hand performed the task under 25 different conditions. These conditions were determined by the combination of five aperture sizes and five different task locations. The 25 conditions were performed twice, once using the open-end and once using the ratchet wrench. Major results of this study (within the range of conditions explored) are as follows. First, regardless of the type of wrench used, work times decreased as aperture size increased. However, increasing aperture size beyond 30 cm (12 inches) did not appreciably shorten work times. Work times using the ratchet wrench were considerably faster than those obtained with the open-end wrench. Second, the best overall performance times were obtained at the rear location. The next best times were obtained at the left side and bottom locations, while the right side and top locations yielded the worst times. (Author)

5/6. HUMANITIES

AD-631 692 **See Fld. 9/2**

5/7. LINGUISTICS

AD-631 337 Fld. 5/7
CFSTI Prices: HC $2.00 MF $0.50
SYSTEM DEVELOPMENT CORP SANTA MONICA CALIF
BRACKETED CONTEXT FREE LANGUAGES.
by Seymour Ginsburg, and Michael A. Harrison. 4 Jan 66, 38p. Rept. no. Scientific-8,TM-738/023/00
Contract AF 19 (628)-5166, Proj. AF-5632, Task 563205,
AFCRL 66-109
Unclassified report

Descriptors: (*Context free grammars, Analysis), Transformational grammars, Computational linguistics, Algebra

A bracketed grammar is a context free grammar in which indexed brackets are inserted around the right-hand sides of the rules. The language generated by a bracketed grammar is a bracketed language. An algebraic condition is given for one bracketed language to be a subset of another. The intersection and the difference of two bracketed languages with the same brackets and terminals are context free (although not necessarily bracketed) languages. Whether L (G1) is a subset of L (G2) and whether the intersection of L (G1) with L (G2) is empty are solvable problems for arbitrary bracketed grammars G1 and G2 with the same brackets and same terminals. Bracketed languages are shown to be codes with strong properties. (Author)

AD-631 779 Fld. 5/7, 12/1
CFSTI Prices: HC $2.00 MF $0.50
STANFORD UNIV CALIF INST FOR MATHEMATICAL STUDIES IN THE SOCIAL SCIENCES
LANGUAGE IDENTIFICATION IN THE LIMIT.
Revised ed.,
by E. Mark Gold. Dec 65, 34p. Contract AF-AFOSR-856-65, Proj. AF-9769
AFOSR 66-0419
Unclassified report

Revision of RAND RM-4136-PR, Jul 64 (AD-602 071).

Descriptors: (*Language, Identification), (*Mathematical logic, Language), (*Computational linguistics, Theory), Decision making, Artificial intelligence, Mathematical models, Numbers, Functions, Reasoning, Theory, Cybernetics, Context sensitive grammars, Algorithms, English language

AD-631 241 **See Fld. 5/2**

AD-631 242 **See Fld. 5/2**

AD-631 748 **See Fld. 5/2**

5/8. MAN-MACHINE RELATIONS

AD-631 396 **See Fld. 9/2**

AD-631 535 **See Fld. 9/2**

AD-631 663 **See Fld. 1/4**

5/9. PERSONNEL SELECTION, TRAINING AND EVALUATION

AD-631 196 Fld. 5/9
CFSTI Prices: HC $2.60 MF $0.50
NAVAL PERSONNEL RESEARCH ACTIVITY SAN DIEGO CALIF
QUALIFICATIONS STANDARDS FOR THE AVIATION SUPPORT EQUIPMENT TECHNICIAN (AS) RATING.
Research memo.,
by R. V. May,Jr., and J. R. Heinzel. Feb 66, 30p. Rept. no. SRM-66-18,
Proj. PF016080301,
Unclassified report

Descriptors: (*Technicians, *Job analysis), (*Aviation personnel, Technicians), (*Naval personnel, Aviation personnel), Standards, Maintenance, Maintenance personnel, Military requirements

The report summarizes the procedures followed in developing the advancement in rating qualifications for the recently established rating of Aviation Support Equipment Technician (AS). A copy of the final proposed qualifications is presented. (Author)

AD-631 208 Fld. 5/9
CFSTI Prices: HC $4.60 MF $0.50
HUMAN RESOURCES RESEARCH OFFICE GEORGE WASHINGTON UNIV ALEXANDRIA VA
RESEARCH ON THE TRAINING OF NONCOMMISSIONED OFFICERS: A SUMMARY REPORT OF PILOT STUDIES.
Technical rept.,
by Paul D. Hood, Richard P. Kern, and Morris Showel. Dec 65, 44p. Rept. no. TR-65-17,
Contract DA-44-188-ARO-2, Proj. DA-2J024701A712-01,
Unclassified report

Descriptors: (*Military personnel, Military training), (*Military training, *Leadership), Motivation, Job analysis, Selection, Aptitude tests, Sociometry, Performance (Human), Effectiveness

As part of a continuing research effort on junior NCO leadership preparation training for advanced basic trainees, exploratory studies were conducted on: (1) problems of selection and assessment of potential leaders among new recruits, (2) feasibility of course compression within the Light Weapons Infantryman MOS training to permit introduction of leadership preparation material, (3) development of an orientation program and motivational techniques for prospective leadership candidates, (4) definition of leadership skills fundamen-

tal to job performance at the junior NCO level and appropriate for training at the AIT level, and (5) exploration of methods for introducing junior NCO preparation within the Advanced Individual Training program. The studies yielded preliminary information relative to junior NCO leadership training on aptitude and sociometric ratings as promising selection factors, possible improvements in training methods, the need for development of criteria to assess technical proficiency and leadership skills, and the relation between training environment and effective leadership performance. (Author)

AD-631 230 Fld. 5/9
NAVAL MEDICAL FIELD RESEARCH LAB CAMP LEJEUNE N C
EVALUATION OF A NEW COMBAT CONDITIONING COURSE,
by P. J. Rasch, G. E. Otott, M. Brown, I. D. Wilson, and R. J. Norton. Apr 66. 12p. Rept. no. Vol. 16/No. 11, NAVMED MR022.01.04-8002.3
Unclassified report

Availability: Published in Military Medicine v131 n2 p130-6 Feb 1966. Copies to DDC users only.

Descriptors: (*Military training, *Physical fitness), (*Teaching methods, Military training), Armed forces (Foreign), Great Britain, Belgium, Marine Corps, Psychometrics, Time, Correlation techniques

The purpose of the investigation was (1) to compare the outcomes of the British and Belgian methods of circuit training with those of the conventional physical training program now in use at the Marine Corps Recruit Depot, Parris Island; (2) to evaluate certain new physical tests; and (3) to determine the correlation between the General Information Test and physical performance. It was found that (1) the combination of circuit and interval training produced as much improvement in a total training time of 13-1/2 hours as did the conventional training program in 31 hours; (2) a battery of tests based on the work of Fleishman may be useful in the measurement of physical fitness; and (3) there were no statistically significant correlations between scores in the GIT and various physical performance tests. Further studies of circuit training and the Fleishman tests are recommended. (Author)

AD-631 405 Fld. 5/9, 5/10
CFSTI Prices: HC $9.60 MF $0.75
NAVAL TRAINING DEVICE CENTER PORT WASHINGTON N Y
AUGMENTING FEEDBACK AND TRANSFER OF TRAINING.
Final technical rept.,
by Gene Mitcheli. Mar 66, 92p. Rept. no. NTDC-1H-41,
Proj. 7635-1-P2,
Unclassified report

Descriptors: (*Transfer of training, Feedback), (*Tracking, Transfer of training), Visual perception, Auditory perception, Display systems, Training

The major finding of the study which was not expected on the basis of previous studies of augmenting feedback was that increasing amounts of information in the augmenting feedback paired with primary feedback conditions that presented little information resulted in positive transfer effects. Specifically, it was found that subjects learned something about the difficult auditory tracking task which persisted following removal of highly informative visual augmenting feedback. This indicates the need to extend the range of task difficulty in augmenting feedback studies to account for tasks presenting very little informative feedback. (Author)

AD-631 414 Fld. 5/9
CFSTI Prices: HC $3.60 MF $0.50
CINCINNATI UNIV OHIO
AN EVALUATION OF PROGRAMED INSTRUCTION FOR TEACHING FACTS AND CONCEPTS.
Final rept., Apr 64-Aug 65,
by James N. Jacobs, Kirk A. Johnson, and John S. Abma. Dec 65, 34p. Contract AF 33 (657)-10234, Proj. AF-1710, Task 171007, AMRL TR-65-222
Unclassified report

Prepared in cooperation with Cincinnati Public School System.

Descriptors: (*Programmed instruction, Effectiveness), Linear systems, Education, Retention, Learning, Teaching methods

The study evaluated five methods of teaching an academic topic ('Bill of Rights') to high school classes. The five methods were: (1) linear program in class, (2) linear program as homework plus discussion in class, (3) text version of linear program in class, (4) text version of linear program as homework plus discussion in class, and (5) conventional lecture-discussion method in class. The linear program alone provided the best results when measured both for the learning of factual material and general concepts about the topic. The linear program was best for high, intermediate, and lower levels of scholastic aptitude. (Author)

AD-631 505 Fld. 5/9, 9/2
CFSTI Prices: HC $2.60 MF $0.50
NAVAL PERSONNEL RESEARCH ACTIVITY SAN DIEGO CALIF
PROGRAM PROFILE: MANUAL FOR USE OF COMPUTER IN ENLISTED CLASSIFICATION.
Technical bulletin,
by Bruce R. Wood, Carl Schuster, and John Martin. Apr 66, 27p. Rept. no. STB-66-27, Proj. PF016050201,
Unclassified report

Descriptors: (*Programming (Computers), Personnel management), (*Personnel management, Data processing systems), (*Naval personnel, Selection), Classification, Education, Instruction manuals, Job analysis, Psychometrics

The report describes the operation and use of Program PROFILE, the first part of Project COMPASS, a computer assisted classification and assignment system. Program PROFILE, a FORTRAN computer program, considers test scores, procurement categories, and school requirements in determining a recruit's eligibility for the various Navy service schools. It then generates a list of these schools with appropriate accompanying information, to be made available to the interviewer to help in determining what school assignment the recruit will ultimately receive. (Author)

AD-631 629 Fld. 5/9
CFSTI Prices: HC $2.00 MF $0.50
UTAH UNIV SALT LAKE CITY
PRODUCTIVE THINKING IN SCIENCE EDUCATION.
Scientific rept.,
by Calvin W. Taylor. Oct 65, 34p. Contract AF-AFOSR-144-63, Proj. AF-9769, Task 976903, AFOSR 66-0010
Unclassified report

Descriptors: (*Creativity, Education), (*Teaching methods, Creativity), (*Scientific research, Education), Students, Reasoning, Scientific personnel, Learning

Directed to educators in the sciences at the pre-university level, the paper discusses approaches to the communication of scientific information which will stimulate creative thought processes. Distinctions are emphasized between teaching for the purpose of reproducing old knowledge vs. producing new ideas. Creativity is only beginning to become measurable. It is associated with such characteristics as the sensing of problems, originality, flexibility that is spontaneous, flexibility that is adaptive, fluency of ideas, fluency of associations, fluency of expressions, redefining in unusual ways, juggling many ideas simultaneously, penetration, visualization, elaboration, foresight, and certain kinds of evaluation abilities. To promote productivity, it is suggested that science be taught as a human activity, i.e., from the viewpoint of the scientist at work, to permit students to experience the various phases in scientific discovery including the mental search for understanding and incubation periods, as well as the 'a-ha' stage. If much of the creative process is intuitive, nonverbal, and preverbal, premature requirements for verbalization may be detrimental. Suggestions are made concerning procedures and tools which could be tested in the classroom. (Author)

AD-631 730 Fld. 5/9
CFSTI Prices: HC $3.60 MF $0.50
PERSONNEL RESEARCH BRANCH (ARMY) WASHINGTON D C
ABSTRACTS OF PRB RESEARCH PUBLICATIONS--FY 1958.
Technical research note,
by Arthur J. Drucker, and Dorothy L. Barnett.
Sep 58, 33p. Rept. no. PRB-TRN-96,
Unclassified report

Descriptors: (*Army personnel, Army research), (*Army research, Military publications), Abstracts, Personnel management, Selection, Classification, Performance (Human), Psychometrics

The volume identifies both by publication serial number and by R and D Research Task all research publications prepared and released by the Personnel Research Branch of The Adjutant General's Office in FY 1958. The listing includes 4 Technical Research Reports, 19 Technical Research Notes, 25 Research Memorandums, and 2 Research Studies. Abstracts were prepared for the majority of FY 1958 publications. Where a publication was abstracted, the principal research findings were described in non-technical language as much as possible. Technical language was generally used as the most expeditious method of communicating details of research design and analysis.

AD-631 731 Fld. 5/9
CFSTI Prices: HC $3.60 MF $0.50
PERSONNEL RESEARCH BRANCH (ARMY) WASHINGTON D C
ABSTRACTS OF PRB RESEARCH PUBLICATIONS--FY 1959.
Technical research note,
by A. J. Drucker, and Emma E. Brown. Oct 59, 36p. Rept. no. PRB-TRN-105,
Proj. DA-29560000,
Unclassified report

See also AD-631 730.

Descriptors: (*Army personnel, Army research), (*Army research, Military publications), Abstracts, Personnel management, Selection, Classification, Performance (Human), Psychometrics

The volume identifiers both by publication serial number and by Research and Development Research Task all research publications prepared and released by the Personnel Research Branch of The Adjutant General's Office in FY 1959. The listing includes 5 Technical Research Reports, 9 Technical Research Notes, 9 Research Studies, and 14 Research Memorandums. Abstracts were prepared for the majority of FY 1959 publications. Where a publication was abstracted, the principal research findings were described in non-technical language as much as possible. Technical language was generally used as the most expeditious method of communicating details of research and analysis.

AD-631 732 Fld. 5/9
CFSTI Prices: HC $2.60 MF $0.50
PERSONNEL RESEARCH BRANCH (ARMY) WASHINGTON D C

ABSTRACTS OF PRB RESEARCH PUBLICATIONS-FY 1960.
Technical research note,
by Arthur J. Drucker, and Emma E. Brown. Aug 60, 30p. Rept. no. PRB-TRN-109,
Proj. DA-2L95-60-001,

Unclassified report

Descriptors: (*Army personnel, Army research), (*Army research, Military publications), Abstracts, Personnel management, Selection, Classification, Performance (Human), Psychometrics, Bibliographies

The volume identifies both by publication serial number and by Research and Development Research Task all research publications prepared and released by the Personnel Research Branch of The Adjutant General's Office in FY 1960. The listing includes 4 Technical Research Reports, 2 Technical Research Notes, 5 Research Studies, and 23 Research Memorandums. Abstracts were prepared for the majority of FY 1960 publications. Where a publication was abstracted, the principal research findings were described in nontechnical language as much as possible. Technical language was generally used as the most expeditious method of communicating details of research and analysis.

AD-631 752 Fld. 5/9
CFSTI Prices: HC $1.10 MF $0.50
NAVAL AEROSPACE MEDICAL INST PENSACOLA FLA
CAREFULNESS PEER RATINGS AS A PREDICTOR OF SUCCESS IN NAVAL AVIATION TRAINING.
Special rept.,
by Floyd E. Peterson, Norman E. Lane, and Rosalie K. Ambler. 28 Feb 66, 10p. Rept. no. SR-66-1,

Unclassified report

Descriptors: (*Naval training, *Aviation personnel), Perception (Psychology), Behavior, Group dynamics, Effectiveness, Selection, Correlation techniques

Cadets were instructed to indicate whether each of the other members in their class was 'more careful' or 'less careful' than themselves. The Carefulness Ratings (CR) were correlated with scores on each of the primary selection tests and grades in Naval School, Pre-Flight, and the the addition of CR to the validity of the Pensacola Student Prediction was investigated. CR had significant relationships to the majority of the primary selection tests and Pre-Flight grades currently employed as predictors. For this reason, despite a significant relationship of CR to the criterion of success/failure, its unique contribution was too small to be of practical value. (Author)

AD-631 315 See Fld. 20/6

AD-631 361 See Fld. 17/8

AD-631 465 See Fld. 9/3

AD-631 554 See Fld. 6/14

AD-631 712 See Fld. 5/1

5/10. PSYCHOLOGY (INDIVIDUAL AND GROUP BEHAVIOR)

AD-631 238 Fld. 5/10
CFSTI Prices: HC $4.00 MF $1.00
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF ENGINEERING
EFFECTIVE TECHNICAL COMMUNICATIONS, MECHANICAL DESCRIPTION -EXPERIMENT II.
Technical rept.,
by Richard M. Davis. 1965, 130p.
AFIT TR-65-1

Unclassified report

Descriptors: (*Reading, English language), (*Learning, Reading), Factor analysis, Test methods, Social communication, Teaching machines, Effectiveness

The effects of variables upon the effectiveness of a written technical communication were tested in a 3x2x2x2 factorial experiment. The subject matter was a description of a simple mechanism. The variables were (1) the manner in which the size and shape of the machine and its parts were presented, (2) introduction (present or absent), (3) internal orienting material (present or absent), and (4) headings (present or absent). The effectiveness of the message was measured by (1) comprehension, (2) reading time, (3) the readers' impression of the author's knowledge of the subject matter, and (4) the readers' impression of the author's competence as a writer. The audiences tested were (1) bright young people with known technical interests, (2) bright young people without known technical interests, (3) young men of average intelligence known to have technical interests, and (4) young men of below average intelligence known to have technical interests. The structural aids (introduction, internal orientation, and headings) contributed little to the effectiveness of the message as measured by the criteria used, and they even proved harmful in some instances. The experimental method used shows promise as a fairly reliable predictive instrument.

AD-631 523 Fld. 5/10
CFSTI Prices: HC $1.60 MF $0.50
HUNTER COLL OF THE CITY UNIV OF NEW YORK
COMMUNICATOR EFFECTIVENESS IN RELATION TO THE STRENGTH OF THE COMMUNICATION.
Technical rept.,
by Walter Weiss. Mar 66, 18p. Rept. no. TR-6,
Contract Nonr-4309 (00), Proj. RR-00608-02,

Unclassified report

Descriptors: (*Social communication, Effectiveness), Reading, Sources, Attitudes, Analysis of variance, Psychometrics

Two experiments were carried out to determine if source effectiveness is dependent in part on the inherent cogency of the communication. Neither study provided any evidence of an overall interaction effect between source and strength of communication; also, a suggestive finding in the first study of a differential source effect among initially favorable Ss exposed to the stronger communication was not replicated in the second one. (Author)

AD-631 524 Fld. 5/10
CFSTI Prices: HC $2.60 MF $0.50
HUNTER COLL OF THE CITY UNIV OF NEW YORK
EFFECTS OF SOURCES, PLACEMENT OF SOURCES, AND PERSUASIVE COMMUNICATION ON ATTITUDE, REASON GIVING, AND ACTION INTENTIONS.
Technical rept.,
by Walter Weiss, and Henry Solomon. Mar 66, 27p. Rept. no. TR-7,
Contract Nonr-4309 (00), Proj. RR-006-08-02,

Unclassified report

Descriptors: (*Social communication, Effectiveness), (*Reaction (Psychology), Social communication), Attitudes, Reasoning, Sources, Motivation, Psychometrics

The current study comprised essentially a second experiment on the effects of placement of the source (before vs. after exposure to the communication) on communication effectiveness. In addition, data were obtained on effects of the communication and sources on attitude-related cognition and action intentions. 200 college students read a communication urging the admission of Communist China into the UN. The communication was attributed to no named source, to a high prestige author + print-medium combination, or to a low prestige author + print-medium combination. Half of the latter two subgroups were informed of the attributed source combination before they read the communication and half only afterwards. In addition to these five communication groups, a no-communication control group of 40 students was formed. Posttest measures comprised evaluations of the communication and the sources, attitude on the issue, action intentions and attitude-supporting reasons. Only before-placement of the high prestige combination produced significant attitude change. The complex of effects on action intentions and reason-giving was attributed to the joint influences of initial attitude, the communication, and the sources. Evaluations of the sources did not accord with expectations derived from a simple balance formulation which merely takes account of congruence between the viewpoints of the Ss and the sources. (Author)

AD-631 538 Fld. 5/10
NAVAL MEDICAL RESEARCH INST BETHESDA MD
EXPECTATION AND ATTRACTIVENESS OF GROUP MEMBERSHIP AS FUNCTIONS OF TASK DIFFICULTY AND MAGNITUDE OF REWARD,
by Carl Wagner. 28 Jan 66, 14p.
NAVMED MF-022.01.03-1001-1

Unclassified report

Availability: Published in Psychological Reports v18 p471-82 1966. Copies to DDC users only.

Descriptors: (*Group dynamics, Motivation), (*Motivation, Functional analysis), Analysis of variance

Expectation and attractiveness of group membership were measured under conditions of concurrent but independent variation of task difficulty and associated reward magnitude. The experiment was initially performed on a sample of 108 high school psychology students and was replicated on a separate sample of 99 Ss from the same population. In both experiments, the results indicated that task difficulty affected neither dependent variable, but that both expectation and attractiveness increased with greater magnitude of reward. With task difficulty held constant, goal attractiveness varied directly with magnitude of reward, and, by implication, with goal expectation. A post hoc analysis suggested that the effects of magnitude of reward upon attractiveness of group membership were mediated via expectation of attaining this goal. (Author)

AD-631 539 Fld. 5/10
NAVAL MEDICAL RESEARCH INST BETHESDA MD
SOCIAL INTERACTION BETWEEN RATS ON DIFFERENT SCHEDULES OF REINFORCEMENT,
by Ladd Wheeler, and Hank Davis. 1966, 4p.
NAVMED MF022.01.03-1002-11

Unclassified report

Prepared in cooperation with Maryland Univ., College Park.

Availability: Published in Psychon. Sci. v4 n11 p389-90 1966. Copies to DDC users only.

Descriptors: (*Social psychology, Rats), (*Learning, Rats), Training, Behavior

Twelve Long-Evans rats were individually trained on different schedules of reinforcement and then run in pairs in a two-lever cage. Results indicated that various classes of social behavior could be experimentally produced and studied in the same manner as individual behavior by manipulating schedules of reinforcement. (Author)

AD-631 613 Fld. 5/10, 15/3
CFSTI Prices: HC $3.60 MF $0.50
MICHIGAN STATE UNIV EAST LANSING COLL OF COMMUNICATION ARTS
THE EFFECTS OF LOW CREDIBLE SOURCES ON MESSAGE ACCEPTANCE: FOUR EXPERIMENTAL STUDIES IN PERSUASION.
Final rept.,
by Bradley S. Greenberg, and Gerald R. Miller.
Mar 66, 37p. Rept. no. BG-1,
Contract OCD-PS-64-71,
Unclassified report

Descriptors: (*Social psychology, *Civil defense systems), Information theory, Sources, Attitudes, Public opinion, Reaction (Psychology), Fallout shelters

This series of studies provides evidence in support of the following propositions: (1) If a message is to be transmitted to an audience which perceives the message source as relatively low in credibility, the message will be more effective if the identification of the source is delayed until after exposure to the message; (2) where the source of a message is likely to be perceived as relatively low in credibility, the message will be more effective without any identified source than with the low credible source; (3) a message will generally be effective in the intended manner, even with a source perceived as low credible, in comparison with no message at all; (4) when the source of the message is perceived by some audience as high in credibility, the message will be more effective if the source is identified before individuals are exposed to the message. These findings are confirmed in studies dealing with both civil defense topics unrelated to civil defense. (Author)

AD-631 666 Fld. 5/10, 20/6
DEFENCE RESEARCH MEDICAL LABS TORONTO (ONTARIO)
THE PRISM ILLUSION: A FUNCTION OF DISLOCATED EQUIVALENCE CLASSES,
by James G. Taylor. 19 Nov 65, 14p. Rept. no. DRML-RP-606,
Unclassified report

Availability: Published in Perceptual and Motor Skills v22 p219-32 1966. Copies to DDC users only.

Descriptors: (*Prisms (Optics), Distortion), (*Illusions, Optics), Refraction, Monochromatic light, Adaptation (Physiology), Visual perception, Canada

A mathematical analysis of the transformation of the direction of light rays passing through a wedge prism is presented. It is shown that if (x, y) is the angle of incidence and (x', y') the angle of emergence, $y' = y$ and $x' = f(x, y)$. The main properties of this function are displayed, and a numerical example is presented in tabular form. Looking through a prism gives the impression that, in general, y' does not equal y, vertical dimensions being enlarged at the base end and contracted at the apex end of the prism. The function $x' = f(x, y)$ shows that horizontal dimensions are contracted at the base end and expanded at the apex. It is suggested that the perceptual process resists this deformation, so that horizontal dimensions are less contracted and less expanded than the function would indicate. Since this does not affect the dimensions of the retinal image, perceptual expansion (or contraction) of contracted (or expanded) horizontal dimensions entails expansion (or contraction) of vertical dimensions as well. The conclusion that $y' = y$ may be tested by looking through binocular prisms with bases on the temporal sides. If y' does not equal y, vertical disparity will make binocular fusion difficult. No failure of fusion was reported. (Author)

AD-631 667 Fld. 5/10
DEFENCE RESEARCH MEDICAL LABS TORONTO (ONTARIO)
SERIES EFFECT IN MONOCULAR PERCEPTION OF SLANT,
by A. H. Smith. 30 Nov 65, 8p. Rept. no. DRML-RP-607,
Unclassified report

Availability: Published in Perceptual and Motor Skills v22 p295-302 1966. Copies to DDC users only.

Descriptors: (*Visual perception, Analysis of variance), Geometric forms, Canada

In Exp. I, 24 Os reviewed a circular disc monocularly, under reduced conditions, in the frontal-parallel plane and at geometric slants of 15 deg, 30 deg, 45 deg, and 60 deg, in random, increasing and decreasing order of angles. Os estimated slant by setting a tilt-rod from the vertical, the horizontal, and the position of the preceding response. The response pattern, increase in error to 30 deg or 45 deg and decrease to 60 deg, was stable for most conditions. Amount of error was affected by order and tilt-rod setting. The results for order and for the response and vertical initial settings of the tilt-rod were interpreted in terms of anchoring. The results for the horizontal initial setting were ascribed to extension of subjective reference scales. Exp. II tested the possibility that the results for order were due to figural aftereffect. Os fixated the disc for 4 min. at 15 deg and later estimated its slant at 60 deg, and conversely. The results, relative to those for a control condition involving 4-sec. exposures of the disc, were negative. (Author)

AD-631 668 Fld. 5/10
DEFENCE RESEARCH MEDICAL LABS TORONTO (ONTARIO)
A TABLE OF D' FOR A MODEL OF THE UNFORCED CHOICE EXPERIMENT,
by M. M. Taylor, and W. C. G. Fraser. 19 Jan 66, 1p. Rept. no. DRML-TN-628,
Unclassified report

Availability: Published in Perceptual and Motor Skills v22 p282 1966. Copies to DDC users only.

Descriptors: (*Perception (Psychology), *Decision making), Tables, Probability, Signals, Programming (Computers), Canada

In the usual form of detection experiment, S is required either to judge whether a signal was present in some time interval or to judge in which of two or more intervals a signal was presented, knowing that it occurred exactly once. A different experiment that can prove useful (e.g., Mackworth and Taylor, 1963), requires S to judge not only whether there was a signal but in which of two intervals it was given if it occurred. We have prepared a table of values of d' applicable to such an experiment. When only the presentations including a true signal are counted, the experiment results in three numbers: N, the total number of signal presentations, K, the number of signals whose interval is correctly identified, and W, the number of wrong identifications. There are then N-K-W 'No Decision' responses. The table presents the values of d' corresponding to P (Correct) = K/N from 0.01 by steps of 0.01 to 0.99 and to P (Wrong) = W/N from 0.01 by steps of 0.01 to 1-P (Correct). The introduction to the table presents the models used in computation of d' and gives FORTRAN II programmes that may be used to produce further tables of d' in cases where different assumptions about the probability distributions, or finer intervals of tabulation may be desired. (Report quoted in its entirety)

AD-631 741 Fld. 5/10
CFSTI Prices: HC $2.00 MF $0.50
ILLINOIS UNIV URBANA GROUP EFFECTIVENESS RESEARCH LAB
THE EFFECTS OF INTER-GROUP COMPETITION IN QUASI-THERAPEUTIC LEADERS ON THE ADJUSTMENT OF SMALL MILITARY GROUPS.
Technical rept.,
by Doyle W. Bishop, James M. Alsobrook, and Fred E. Fiedler. Jan 66, 43p. Rept. no. TR-20, Contract DA-49-193-MD-2060,
Unclassified report

Descriptors: (*Group dynamics, *Leadership), (*Military psychology, Group dynamics), (*Adjustment (Psychology), Leadership), Effectiveness, Factor analysis, Analysis of variance

The study investigated the effects of two variables (inter-squad competition vs. non-competition, and quasi-therapeutic vs. non-therapeutic squad leaders) on the adjustment, interpersonal relations, and task effectiveness of military squads. The covariance control variables were the dependent variable's own pretest counterpart and a measure of trainees' perceived harassment. The major results were: (1) The competitive activity and the manner in which it was implemented by the cadre of the experimental companies significantly increased perceptions of harassment by trainees in the competitive squads. (2) When perceived harassment was statistically controlled by analysis of covariance, the adjustment and task effectiveness of the competitive squads improved significantly relative to the control squads. The improved adjustment appeared to be primarily in the task-related areas. No improvement in interpersonal relations was found for the competitive squads. (3) No reliable main effects were found for the quasi-therapeutic leader manipulation. (4) Some interactive effects of competition and quasi-therapeutic leadership were found. (Author)

AD-631 405 See Fld. 5/9

AD-631 457 See Fld. 6/19

AD-631 634 See Fld. 6/4

AD-631 781 See Fld. 15/7

AD-631 811 See Fld. 6/19

5/11. SOCIOLOGY

AD-631 594 Fld. 5/11
CFSTI Prices: HC $3.00 MF $0.75
RAND CORP SANTA MONICA CALIF
PUBLICATIONS OF THE SOCIAL SCIENCE DEPARTMENT, THE RAND CORPORATION, 1948-1966,
by Ian C. C. Graham, and Bonnie S. Lieb. Apr 66, 96p. Rept. no. RM-3600-3,
Unclassified report

Descriptors: (*Social sciences, *Bibliographies), Political science, USSR, Communism

The Memorandum contains a bibliography of unclassified books, Reports (R's), RAND Memoranda (RM's), Papers (P's), and Translations (T's) that have been issued by (or, in the case of books, published for) the Social Science Department of The RAND Corporation from its inception to March 31, 1965. It replaces RM-3600-1 issued in March 1964 (AD-431 730).

AD-631 727 See Fld. 5/1

Field 6-BIOLOGICAL AND MEDICAL SCIENCES

6/1. BIOCHEMISTRY

AD-631 214 Fld. 6/1, 7/3
ATLANTIC REGIONAL LAB HALIFAX (NOVA SCOTIA)
THE OCCURRENCE OF D- (+)-14/25-CYCLOHEXANETETROL IN MONOCHRYSIS LUTHERI DROOP,

by J. D. Ramanathan, J. S. Craigie, J. McLachlan, D. G. Smith, and A. G. McInnes. 29 Jan 66, 6p.

NRC 8784

Unclassified report

Availability: Published in Tetrahedron Letters n14 p1527-31 1966. Copies to DDC users only.

Descriptors: (*Algae, Tissue extracts), (*Cyclohexanols, Molecular properties), Separation, Purification, Molecular structure, Molecular rotation, Steriochemistry, Canada

The only naturally occurring cyclohexanetetrol reported in the literature is betitol, weakly dextrorotatory (exact rotation not reported), m.p. 224C, which was isolated from sugar beet molasses in 1901. In this communication the first unambiguous proof is reported for the structure of a naturally occurring optically active cyclohexanetetrol which was obtained from the chrysophycean algae monochrysis lutheri), and on the basis of rotation data its absolute configuration is predicted.

AD-631 250 Fld. 6/1
DALHOUSIE UNIV HALIFAX (NOVA SCOTIA)
TAXONOMIC DISTRIBUTION OF AMMONIA-LYASES FOR L-PHENYLALANINE AND L-TYROSINE IN RELATION TO LIGNIFICATION,
by M. R. Young, G. H. N. Towers, and A. C. Neish. 4 Nov 65, 9p.
NRC 8843

Unclassified report

Availability: Published in Canadian Journal of Botany v44 p341-9 1966. Copies to DDC users only.

Descriptors: (*Amino acids, Lyases), (*Lyases, Distribution), (*Lignin, Biosynthesis), Bacteria, Plants (Botany), Animals, Enzymes, Phenylalanine, Tyrosine, Algae, Lichens, Cereals, Enzyme inhibitors, Canada

A general survey of the plant kingdom and a number of bacterial and animal sources was made for the enzymes L-phenylalanine ammonia-lyase (EC.4.1.3.5.) and L-tyrosine ammonia-lyase (EC. 4.1.3.). The above enzymes could not be detected in bacteria, animal tissues, algae, lichens, fungi, or mosses, substantiating the view that their presence may be correlated with the ability of plants to synthesize phenylpropanoid compounds related to lignin. Cereals had the highest content of tyrosine ammonia-lyase, as expected from their known high efficiency in converting tyrosine to lignin. In addition, Chrysanthemum sp. (in which neither enzyme could be detected) was shown to contain potent, natural inhibitors of these enzymes. (Author)

AD-631 263 Fld. 6/1
PRAIRIE REGIONAL LAB SASKATOON (SASKATCHEWAN)
AROMATIC METABOLISM IN PLANTS. I. A STUDY OF THE PREPHENATE DEHYDROGENASE FROM BEAN PLANTS,
by Oluf L. Gamborg, and Fred W. Keeley. 14 Jun 65, 8p.
NRC 8799

Unclassified report

Availability: Published in Biochimica et Biophysica Acta v115 p65-72 1966. Copies to DDC users only.

Descriptors: (*Oxidoreductases, *Plants (Botany)), (*Metabolism, Plants (Botany)), Vegetables, Enzyme inhibitors, Seeds, Pyruvates, Coenzymes, Transferases

Prephenate dehydrogenase (prephenate: NADP (+) oxidoreductase (decarboxylating)) was isolated from cotyledons of wax bean (Phaseolus vulgaris L. var. Bountiful). The enzyme utilizes NADP (+) as an oxidant. The optimum pH for activity is 7.5, and the maximum stability of the enzyme at 22 degrees is achieved in the pH range from 7 to 8. The enzyme is inhibited by sulphydryl complexing compounds. Addition of phenylalanine, tyrosine, or cinnamate did not depress the rate of formation of 4-hydroxyphenylpyruvate. The prephenate dehydrogenase also is present in the cotyledons and the shoots of mung bean (Phaseolus aureus Roxb.). A study was made of the variation in the amount of prephenate dehydrogenase and aromatic amino acid transaminase in developing mung bean plants. The results show that the dehydrogenase is present in largest concentration in the cotyledons 4-5 days after germination has been initiated, and the transaminase reaches the highest level in the shoots after 12-14 days of growth. (Author)

AD-631 530 Fld. 6/1
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF APPLIED BIOLOGY
A PRELIMINARY ANALYSIS OF THE PROTEINS OF THE PRIMARY WALLS OF SOME PLANT CELLS,
by N. J. King, and S. T. Bayley. 7 Feb 64, 12p.

Unclassified report

Availability: Published in Journal of Experimental Botany v16 n47 p294-303 May 1965. Copies to DDC users only.

Descriptors: (*Plants (Botany), Cell wall), (*Cell wall, *Proteins), (*Amino acids, Cell wall), Microsomes, Hydrolysis, Alcohols, Pyrrols, Carboxylic acids, Molecular rotation, Tissues (Biology), Chromatographic analysis, Canada

Amino-acid analyses on hydrolysates of the wall, microsomal, and soluble fractions of Jerusalem artichoke tubers, pea stems, and oat coleoptiles showed that the wall fractions alone contained hydroxyproline. In the case of Jerusalem artichoke, this substance was positively identified as 1-hydroxyproline. In the electron microscope, contamination of the wall fraction by cytoplasm and cytoplasmic membrane was found to be negligible. Analyses on Jerusalem artichoke tuber tissue showed that the amounts of protein and hydroxyproline in the walls increased with growth. It is concluded that a distinct group of proteins containing hydroxyproline form an integral part of the primary walls of these tissues. (Author)

AD-631 540 Fld. 6/1
NAVAL MEDICAL RESEARCH INST BETHESDA MD
QUANTITATIVE DETERMINATION OF HAEMOGLOBIN A2 BY ACRYLAMIDE-GEL ELECTROPHORESIS,
by Thomas G. Ferris, Robert E. Easterling, and Richard E. Budd. Dec 65, 6p.
NAVMED MR-005.12-1402.1-1

Unclassified report

Availability: Published in Nature v208 n5015 p1103-4 Dec 11 1965. Copies to DDC users only.

Descriptors: (*Hemoglobin, *Electrophoresis), Gels, Amides, Separation

A method for the quantitative determination of haemoglobin A2 by acrylamide-gel electrophoresis is described and the normal range of Hb A2 by this method is reported and compared to the normal range as determined by other techniques. (Author)

AD-631 544 Fld. 6/1
CFSTI Prices: HC $1.60 MF $0.50
NAVAL AIR DEVELOPMENT CENTER JOHNSVILLE PA AEROSPACE MEDICAL RESEARCH DEPT
SOLID STATE MECHANICS OF ION TRANSPORT IN BIOLOGICAL SYSTEMS.
Phase rept.,
by Freeman W. Cope. 31 Dec 65, 17p. Rept. no. NADC-MR-6518,
NAMED MR005.13-002.7-26

Unclassified report

Descriptors: (*Electrolytes (Physiology), Transport properties), (*Semipermeability, Theory), (*Sodium, Transport properties), Semiconductors, Carriers (Semiconductors), Models (Simulations), Ions, Crystals, Liquids, Gels, Muscles, Cells (Biology), Osmosis, Nuclear magnetic resonance, Complex compounds

Leakage of Na (+) across the surface of muscle cells has been observed to obey the Elovich equation, which previously was found to describe various electron transport processes at surfaces of inorganic semiconductors. Analogies between solid state electron transport and liquid or gel state ion transport permit the derivation of the Elovich equation for Na (+) transport across the surface of the muscle cell, but only if it is assumed that muscle Na (+) exists mostly in a complexed form. Direct experimental verification of this theoretical prediction was obtained by NMR analysis of muscle Na (+). The similarities between the behavior of ions in cells and electrons in semiconductors suggest the presence of some degree of order or crystallinity in cells, which suggests the applicability to biology of concepts derived from the study of liquid crystals. (Author)

AD-631 614 Fld. 6/1, 6/5
JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF MICROBIOLOGY
REVERSIBLE ADSORPTION OF C'2 BY EAC'4: ROLE OF MG (2+), ENUMERATION OF COMPETENT ASAC'4, TWO-STEP NATURE OF C'2A FIXATION AND ESTIMATION OF ITS EFFICIENCY,
by Gerald Sitomer, Robert M. Stroud, and Manfred M. Mayer. 19 May 65, 13p. Contract Nonr-248 (60),NSF-G-19372 Proj. NR-108-104,

Unclassified report

Availability: Published in Immunochemistry v3 p57-69 1966. Copies to DDC users only.

Descriptors: (*Antigens + antibodies, Adsorption), (*Complement, Magnesium), (*Erythrocytes, Adsorption), Enzymes, Reaction kinetics, pH, Temperature, Ionization, Electrolytes (Physiology), Hemolysis, Thermodynamics, Complex compounds

Sensitized erythrocytes of antigen-antibody complexes carrying C'4 sites adsorb C'2 reversibly, and evidence is presented which suggests that the receptor group for fixation of C'2a is located on the C'4 molecule. Adsorption is favored by increase of pH, or temperature, and by decrease of ionic strength. Mg (2+) is essential and adsorption reaches a maximum at a concentration of about 1 or 2 mM. This finding explains the Mg (2+) requirement in immune hemolysis. By use of the Langmuir adsorption isotherm for quantitative analysis of adsorption data, the C'4 multiplicity of EAC'4 and the binding constant was measured. A comparison of adsorption of C'2 on EAC'1a,4 and EAC'4, at 0C, ionic strength 0.06, pH 7.35 and 1 mM Mg (2+), yielded binding constants of 3.3 and 1.9 x 10 to the 11th power ml/SFU, respectively. (Author)

AD-631 215 **See Fld. 6/13.**

AD-631 221 **See Fld. 6/13**

6/2. BIOENGINEERING

AD-631 197 **See Fld. 6/12**

6/3. BIOLOGY

AD-631 480 Fld. 6/3
CFSTI Prices: HC $6.00 MF $1.25
WEATHER SQUADRON (7TH) DETACHMENT 6
INVESTIGATION OF ELECTRIC AND MAGNETIC SENSITIVE FISHES.

Final rept., 1 Nov 62-31 Oct 65,
by Eugene Agelides. Dec 65, 247p. Contract Nonr-3993 (00)

Unclassified report

Descriptors: (*Fishes, Sensitivity), (*Electrophysiology, Fishes), (*Electric fields, Fishes), Sense organs, Magnetic fields, Anatomy, Electric currents

Several species of electric and magnetic sensitive fish were investigated. The report describes and summarizes the work and the related behavioral and physiological experiments. The fresh-water electric fishes studied in the laboratory included specimens of South American Electrophoridae, Rhamphichthyidae, Sternarchidae, and Gymnotidae; and African Malapteruridae, Mormyridae, and Gymnarchidae. The investigation of these fishes included the study of some of their electric transmitting and receiving organs and their electric activity under different environmental conditions such as water temperature. Also studied was the distortion of the signals emitted by the electric fishes at various distances. The signals were analyzed to determine their coding form, repetition rate, and modulation type. The effect of applying ac and dc stimuli of varying amplitudes to the fishes was also investigated; the threshold of their sensitivity to external impulses was thus established. A hypothesis was advanced on the way electro-receptors react to electric stimuli. A behavioral study model is shown. The taxonomy of many electric fishes with some evolutionary aspects is also given. (Author)

AD-631 370 See Fld. 12/2

AD-631 609 See Fld. 6/5

6/4. BIONICS

AD-631 634 Fld. 6/4, 5/10, 9/2
CFSTI Prices: HC $4.00 MF $0.75
SYSTEM RESEARCH LTD RICHMOND (ENGLAND)
RESEARCH ON CYBERNETIC INVESTIGATION OF LEARNING AND PERCEPTION.
Annual summary rept. no. 3,
by Gordon Pask, M. Elstob, and George L. Mallen. 15 Feb 66, 104p. Contract AF 61 (052)-640, Proj. AF-9769,
AFOSR 66-0644

Unclassified report

See also AD-611 543.

Descriptors: (*Cybernetics, *Learning), (*Perception (Psychology), Cybernetics), (*Learning machines, Analysis), Artificial intelligence, Mathematical models, Automata, Memory, Stability, Control systems, Great Britain

Research is summarized on models that describe the learning of a structured skill and on simulations of populations of automata that become more complex as they develop. Applicability and limitations on a simple learning model based on terms of continuous, information-like measures are discussed. The model considers the contribution from learning of the i-th skill to learning of the j-th. Limitations arise for the description of learning of higher-order concepts. The relevance of statistical and homeostatic approaches to the description of learning and adaptation is considered; each is viewed as contributing to the characterization of a real-life population of organisms. The simulation model shows that individual automata do not learn on their own but in cooperating groups. The elaborate population that is postulated shows stability over a larger range of cost parameter values in an unconstrained environment than in a constrained environment. A gregarious automaton is described that has a sensory system (sensitivity to density of population) and a memory system; significance is associated with properties that remain invariant or exhibit regular and correlated transformation. (Author)

AD-631 429 See Fld. 5/1

6/5. CLINICAL MEDICINE

AD-631 193 Fld. 6/5
CALIFORNIA UNIV SAN FRANCISCO MEDICAL CENTER
HETEROGENEITY OF IMMUNE ANTI-A ANTIBODY IN RELATION TO FORSSMAN ANTIGEN,
by Mitsuo Yokoyama, and H. H. Fudenberg. 13 Sep 65, 8p. Contract Nonr-3656 (12),PHS-AM-8527 Proj. NR-105-308,

Unclassified report

Prepared in cooperation with Hawaii Univ., Honolulu, Dept. of Genetics.

Availability: Published in The Journal of Immunology v96 n2 p304-10 1966. Copies to DDC users only.

Descriptors: (*Antigens + antibodies, Immunity), (*Antigen - antibody reactions, Analysis), Erythrocytes, Blood serum, Guinea pigs, Blood groups, Mammals, Humans, Rabbits, Enzymes, Immune serums

Guinea pig antigen, sheep red cells (type R), human group A1 red cells and soluble specific blood group substance A contain a similar A-like antigenic determinant. The A-like antigen of certain pig red cells (A (pi)) reacts with 'immune' but not with 'naturally occurring' anti-A antibody in human serum. Pig A (p) red cells also absorb anti-sheep red cell hemolysin from human sera containing 'immune' anti-A antibody, but not from those containing 'naturally occurring' anti-A; furthermore, such cells do not absorb the anti-sheep red cell hemolysin present in immune rabbit serum. These results suggest that immune group O sera may contain an antibody specific against both A antigen and Forssman antigen. (Author)

AD-631 194 Fld. 6/5
CALIFORNIA UNIV SAN FRANCISCO MEDICAL CENTER
MOLECULAR LOCALIZATION OF GM (A) AND GM (B) FACTORS IN NEGROES,
by H. H. Fudenberg, D. Feinstein, W. McGehee, and E. C. Franklin. 1966, 9p. Contract Nonr-3656 (12),PHS-HE-05997 Proj. NR-105-308,

Unclassified report

Prepared in cooperation with New York Univ., N. Y., School of Medicine.

Availability: Published in Vox Sang. v11 p45-53 1966. Copies to DDC users only.

Descriptors: (*Gamma globulin, *Genetics), Distribution, Blood serum, Electrophoresis, Antigens + antibodies, Immunology, Blood groups, Immune serums

Twenty We (gamma 2b) myeloma proteins from Negroes were examined to determine their Gm types; none of these proteins was Gm (a+b+); all were Gm (a+). Two Vi (gamma 2c) myeloma proteins were Gm (b+). This finding, taken in conjunction with the molecular localization of the Gm (a) and Gm (b) factors, suggests that these factors are determined by two closely linked loci, as appears to be the case in Caucasians. Further, the peptide maps of Gm (a+) Negro myeloma proteins were similar to those of Gm (a+) myeloma proteins of Caucasians, both containing a distinctive 'Gm (a)' peptide and lacking the 'Gm (b, f)' peptide; the peptide maps of Negro and Caucasian Gm (b+) myeloma proteins were also similar. It appears unnecessary to postulate the existence of a Gm (ab) allele in the Negro to account for the fact that 100% of African Negroes are Gm (a+b+). (Author)

AD-631 204 Fld. 6/5
CFSTI Prices: HC $1.00 MF $0.50
SCHOOL OF AEROSPACE MEDICINE BROOKS AFB TEX
PROTECTION OF ENAMEL SURFACES BY COMMERCIAL AND LABORATORY-PREPARED STANNOUS FLUORIDE PROPHYLAXIS PASTES.
Final rept. Jan-Nov 64,
by Ira L. Shannon. Feb 66, 16p. Rept. no. SAM-TR-66-15,
Proj. AF-7753, Task 775303,

Unclassified report

Descriptors: (*Teeth, Diseases), (*Tin compounds, Fluorides), Dentistry, Solubility, Lactic acid

A laboratory investigation was carried out in which both commercially available and laboratory prepared prophylaxis pastes were evaluated as to ability to decrease enamel solubility in lactic acid. Commerically available mixtures from which pastes containing approximately 8% to 10% stannous fluoride were prepared, reduced enamel solubility by about 60% to 80%. Higher concentrations of stannous fluoride provided somewhat more protection, but this increase was not sufficient to offset the disadvantage of increased clinical complications reported for these pastes. The incorporation of stannous fluoride in a prophylaxis mixture is to be recommended. While the subsequent topical application of a stannous fluoride solution is also desirable, it is recognized that the time required for this procedure must be markedly reduced if universal acceptance is to be attained. (Author)

AD-631 226 Fld. 6/5
CFSTI Prices: HC $1.00 MF $0.50
NAVAL RADIOLOGICAL DEFENSE LAB SAN FRANCISCO CALIF
FURTHER OBSERVATIONS ON POTENTIAL IMMUNOLOGICALLY COMPETENT CELLS OF FETAL LIVER ORIGIN,
by Marvin L. Tyan, and Leonard J. Cole. 10 Mar 66, 24p. Rept. no. USNRDL-TR-990, NAVMED MR005.08.1200-2

Unclassified report

Descriptors: (*Antigen - antibody reactions, *Transplantation), Immunology, Liver, Embryos, Mice, Cells (Biology), Thymus, Erythrocytes, Bone marrow

Using a modified graft-versus-host method, attempts were made to promote the maturation of potential immunologically competent cells of fetal liver origin (parental) in thymectomized F1 hybrid hosts by means of irradiated and nonirradiated syngeneic (with respect to the fetal liver cells) and allogeneic thymus grafts, suspensions of cells from syngeneic thymus, and syngeneic and allogeneic thymus placed in diffusion chambers. It was found that, in this experimental model, only those thymus grafts which survived in the primary host for a prolonged period (i.e., syngeneic) and to which the fetal liver cells had direct physical access would promote the maturation of these lymphoid precursor cells. In addition it was noted that: (1) the method used had immunologic specificity; (2) viable fetal liver cells or thymus grafts were required in all experimental systems; (3) 18-20 day dissociated fetal thymus gave no evidence of the presence of either mature or immature lymphoid cells; and (4) potential immunologically competent cells appeared to be incapable of producing hemagglutinins to rat erythrocytes or of rejecting allogeneic or xenogeneic skin grafts in the absence of the host thymus. (Author)

AD-631 305 Fld. 6/5
CFSTI Prices:MF $1.25
PROSTHETIC AND SENSORY AIDS SERVICE VETERANS ADMINISTRATION WASHINGTON D C
BULLETIN OF PROSTHETICS RESEARCH.
1965, 237p. Rept. no. bpr-10-4-Fall-1965,

Unclassified report

See also AD-613 531. Availability: Available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.75 as VA 1.23/4.

Descriptors: (*Prosthetics, Medical research), Amputation stumps, Amputees, Medical supplies, Power, Physical properties

Contents: Editorial--Unity in Diversity, Amputation, Immediate post-surgical prosthetic fitting, Hip-level amputation, Some notes on canes and cane tips, The use of low friction housing liner in upper-extremity prostheses, Impedance plethysmography in relation to the unilateral amputee, Power for prostheses, A new approach to stump shrinkage for above-knee amputees, Newsletter from George T. Aitken, M. D., Semiannual report of the VAPC, Highlights of VA contractual research program, Notes and news, Technical tidbits, Reported abroad, Recent patents, Publications of interest, Calendar of events.

AD-631 333 Fld. 6/5
LOBUND LAB UNIV OF NOTRE DAME IND
A TECHNIQUE FOR THYMECTOMIZING GERMFREE MICE,
by Raphael Wilson, Margaret Bealmear, and Kenneth Sjodin. 28 Jun 65, 3p. Contract Nonr-1623 (15)
Unclassified report

Availability: Published in Journal of Applied Physiology v21 n1 p279-81 Jan 1966. Copies to DDC users only.

Descriptors: (*Thymus, *Excision), Mice, Germ-free animals, Hypothermia, Anesthesia, Diseases

A technique for thymectomizing germfree mice was developed and used successfully. An operating chamber with a window of good optical properties was added to a flexible plastic film isolator to permit maximum visualization of the surgical area, and surgical gloves were mounted into the operating compartment. Hypothermia was selected as the form of anesthesia in order to obviate the problems that would result from using diethyl ether in an environment where static electrical charges accumulate on the inner surface of the isolator. Use of germfree mice for thymus studies provides an animal that does not develop wasting disease and, therefore, is available for long-term experimentation. (Author)

AD-631 440 Fld. 6/5, 6/7
CFSTI Prices: HC $2.00 MF $0.50
BOSTON UNIV MASS HYPOTHERMIA LAB
FACTORS AFFECTING SURVIVAL DURING PROLONGED HYPOTHERMIA.
Final rept., Feb 63-Apr 65,
by E. T. Angelakos. Dec 65, 28p. Contract AF 33 (657)-10755, Proj. AF-7222,AF-7164 Task 722204,716409
AMRL TR-65-182
Unclassified report

Descriptors: (*Hypothermia, *Survival), Mortality rates, Cardiovascular system, Blood chemistry, Anesthesia, Dogs, Exposure, Spleen, Kidneys, Aorta

The mortality of anesthetized dogs maintained under prolonged hypothermia was studied and the factors responsible for death were evaluated. In the technically acceptable experiments, 45% of the dogs maintained at moderate hypothermic temperatures (26 plus or minus 1C) died within 16 hours. The corresponding mortality in normothermic (38C) control dogs was 7%. Progressive hemoconcentration and bradycardia were observed during prolonged hypothermia. The former could be abolished by splenectomy. The use of artificial pacemakers to limit the effects of bradycardia was unsuccessful due to the development of other cardiovascular complications. Blood catecholamine levels increased with cooling to 33C but decreased below control levels at or below 25C; however, prolonged hypothermia at 25C was associated with a progressive increase in blood catecholamines up to two to three times the initial control levels. The catecholamine content of aorta, kidney and spleen was not altered significantly by hypothermia, however, cardiac catecholamines decreased to below 50% of control with cooling to 25C. Adrenergic mechanisms apparently play a key role in the alterations of cardiovascular functions which limit survival during prolonged hypothermia. (Author)

AD-631 542 Fld. 6/5
GENERAL HOSPITAL (97TH) NEW YORK 09757 ORAL SURGERY AND DENTAL CLINIC
REACTIVE INFLAMMATORY PAPILLARY HYPERPLASIA OF THE PALATE,
by Louis H. Guernsey. 1965, 15p.
Unclassified report

Availability: Published in Oral Surgery, Oral Medicine and Oral Pathology v20 n6 p814-27 Dec 1965. Copies to DDC users only.

Descriptors: (*Dentistry, Pathology), (*Mouth, Surgery), Diseases, Tissues (Biology), Teeth, Prosthetics

A total of 5,892 dental records were reviewed. The average incidence of reactive papillary hyperplasia of the palate was 2.9 per cent among denture-wearing patients, whereas it was only 0.2 per cent among non -denture-wearing patients. The lesion was found under all sorts of prostheses--both full and partial, acrylic or cast base metal--and was not necessarily limited to the palatal mucosa proper. The lesion was found most frequently in denture wearers between 20 and 50 years of age, with the highest single incidence of occurrence in the second decade. Eight cases were detected in nondenture wearers. Two general types are recognized: (a) Diffuse papillary and (b) nodular or polypoid. Etiology was discussed. No single cause-and-effect relationship is noted. A predisposition factor is thought to exist. Electrosurgical removal is recommended as the preferred treatment. The clinical and microscopic appearance of the lesion was described. The lesion is considered to be benign, reactive, inflammatory in nature, and essentially devoid of any premalignant potentiality. In the literature reviewed, no study has definitely shown a significant relationship between reactive papillary hyperplasia of the palate and the occurrence of epidermoid carcinoma of the palate. Prevention of recurrence of the lesion was discussed. (Author)

AD-631 609 Fld. 6/5, 6/3, 2/5
CLINICAL INVESTIGATION CENTER OAKLAND CALIF
NATURALLY OCCURRING EMPHYSEMA, THE FINE GROSS AND HISTOPATHOLOGIC COUNTERPART OF HUMAN EMPHYSEMA.
Technical rept. (Interim),
by Richard F. McLaughlin,Jr., and Donald W. Edwards. 14 Aug 64, 11p. Rept. no. GIC-TR-24, Contract Nonr-222 (51),PHS-H-6101 Proj. NR-105-156,
NAVMED MR005.12-1200-4
Unclassified report

Availability: Published in American Review of Respiratory Diseases v93 n1 p22-9 Jan 1966. Copies to DDC users only.

Descriptors: (*Respiratory diseases, Equines), Pathology, Lungs, Laboratory animals, Histology

Pathologic examination of the lungs of two horses revealed that they contained lesions identical to those found in the lungs of seven emphysematous human subjects. These lesions differed greatly from those seen in equine brochiolities. (Author)

AD-631 403 See Fld. 6/13

AD-631 548 See Fld. 6/16

AD-631 614 See Fld. 6/1

AD-631 637 See Fld. 6/16

AD-631 811 See Fld. 6/19

6/6. ENVIRONMENTAL BIOLOGY

AD-631 739 Fld. 6/6
CFSTI Prices: HC $1.00 MF $0.50
IIT RESEARCH INST CHICAGO ILL
DEVELOPMENT OF AN ORALLY EFFECTIVE INSECT REPELLENT.
Quarterly progress rept. for 1 Feb-30 Apr 66,
by Philip Kashin. 30 Apr 66, 24p. Rept. no. IITRI-L6021-6,
Contract DA-49-193-MD-2281, Proj. IITRI-L6021,
Unclassified report

See also AD-627 244.

Descriptors: (*Insect repellants, Effectiveness), (*Culicidae, Insect repellants), Mouth, Amino acids, Carbon dioxide, Chemical bonds, Pest control

A hypothesis that could explain the mechanism of attraction of mosquitoes to mammals was proposed. The hypothesis involves the reversible binding of CO2 to GABA, a substance which mediates synaptic inhibition in many animal species. Experiments showed that GABA does indeed bind CO2 and that the binding is reversed by heating. Preliminary assays for GABA and GABA-CO2 complexes in the crayfish intestine proved negative, but the intestine preparation may not have been adequate to show the effects of the GABA-CO2 complexes. An electrical system was utilized whereby CO2 binding by GABA could be detected. A water vapor, GABA-CO2 model system was found to conform precisely with present knowledge of mosquito behavior. The need for water vapor for binding to occur indicates that bicarbonate ions, rather than dry CO2 are probably involved in the binding of CO2 to GABA. GABA was found by amino acid analysis to be the third most abundant free amino acid in mosquitoes. (Author)

AD-631 320 See Fld. 11/12

6/7. ESCAPE, RESCUE AND SURVIVAL

AD-631 440 See Fld. 6/5

6/8. FOOD

AD-631 689 Fld. 6/8
CFSTI Prices: HC $3.00 MF $0.75
PILLSBURY MILLS INC MINNEAPOLIS MINN
DEVELOPMENT OF FLEXIBLE PACKAGED BREAD -TYPE PRODUCTS INCLUDING BREAD: PHASE I AND II. SINGLE AND MULTIPLE STAGE PROCESSING METHODS.
Technical rept.,
by C. G. Norris, and S. I. Greenberg. Feb 66, 82p. Contract DA-19-129-AMC-91 (N), Proj. DA-1K643303D548,
USA-NLABS FD-66-30 ,USA-NLABS FD-40
Unclassified report

Descriptors: (*Bread, Processing), (*Military rations, Bread), Packaging, Sterilization, Taste, Stability

A white bread type product packaged in a lightweight, flexible pouch was developed. It is palatable, stable, and commercially sterile. Both single and multiple stage processes were explored. Many formulations were tested with the best products

obtained with a synthetic flour formula chemically leavened. A steam water retort was used for cooking and sterilizing the bread product. Sterilization values of F sub o = 4 were required for sterility. (Author)

6/11. LIFE SUPPORT

AD-631 191 Fld. 6/11
CFSTI Prices: HC $2.00 MF $0.50
SCHOOL OF AEROSPACE MEDICINE BROOKS AFB TEX
ALGAL BIOREGENERATIVE SYSTEMS.
Rept. for 1952-1964,
by Richard L. Miller, and Calvin H. Ward. Feb 66, 28p. Rept. no. SAM-TR-66-11,
Task 793001,

Unclassified report

Descriptors: (*Algae, *Life support), (*Closed ecological systems, Life support), (*Oxygen equipment, Algae), Astronauts, Oxygen, Photosynthesis, Reviews

Algae may be used for partial regeneration of man's requirements for life in a closed environment. Feasibility has been demonstrated with model systems, but established principles of algal metabolism impose severe restrictions on the design of thermodynamically efficient, low-volume and low-weight algal gas exchangers. Review of available data on photosynthetic gas exchangers now permits verification of design parameters predicted almost 10 years ago. Experimentally achievable values of electrical efficiency are only a fraction of the theoretical. Significant improvement over or attainment of theoretical values will require major improvement in the conversion of electrical energy into light energy or conversion of light energy into chemical energy by the green plant. Development of a basic design theory would be greatly simplified by a definite mission-oriented goal--e.g., a planetary base. At present there is no material advantage among existing algal exchangers since criteria used for design require compromises of weight, volume, and power. Most algal gas exchangers are inadequately described. More experimental data, obtained by extensive operation of prototype systems, are needed for accurate logistic evaluation. Weight, volume, and power flexibility may ultimately be of advantage in the design of life-support systems for specific space missions, provided long-term reliability can be demonstrated. (Author)

AD-631 400 Fld. 6/11, 14/2
CFSTI Prices: HC $3.60 MF $0.50
NAVAL AIR DEVELOPMENT CENTER JOHNSVILLE PA AEROSPACE MEDICAL RESEARCH DEPT
A LOW PRESSURE CHAMBER FOR ESTIMATION OF THE GAS EXCHANGE RATIO,
by George H. Kydd, and Kenneth H. Dickerson.
30 Dec 65, 37p. Rept. no. NADC-MR-6513,

Unclassified report

Descriptors: (*Controlled atmospheres, Low-pressure research), (*Oxygen equipment, Low-pressure research), Gases, Mixtures, Respiration, Oxygen, Carbon dioxide, Flowmeters, Gas analysis, Punched cards, Data processing systems

An experimental system for exposing small laboratory animals to specified gas mixtures is described. System pressure may be set at levels up to atmospheric. A demand regulator is used to add oxygen to a pre-set pressure level, in proportion to the amount of carbon dioxide removed. Flow-meters and gas analyzers are provided for obtaining the oxygen flow rate into and the carbon dioxide removed from the system. Data from these instruments are read out as often as once a minute and are punched into IBM cards which are processed in a computer. The system is designed for experiments that last for several days or weeks. (Author)

6/12. MEDICAL AND HOSPITAL EQUIPMENT AND SUPPLIES

AD-631 197 Fld. 6/12, 9/5, 6/2
CFSTI Prices: HC $1.00 MF $0.50
SCHOOL OF AEROSPACE MEDICINE BROOKS AFB TEX
AN ECONOMICAL TIME STANDARD FOR CALIBRATING CARDIOTACHOMETERS AND BIOLOGIC DATA RECORDINGS.
Rept. for 10 Aug-1 Dec 65,
by Alfonso Angelone. Feb 66, 17p. Rept. no. SAM-TR-66-10,
Task 632003,

Unclassified report

Descriptors: (*Frequency dividers, Pulse counters), (*Time, Standards), (*Cardiography, Calibration), Pulse generators, Low frequency, Temperature

A single-stage pulse-frequency divider is reported which will divide 60 pulses/sec. by 60, yielding 1-second pulses with reliability from -40 to +80C. Division by 300, yielding pulses at 5-second intervals, is reliable from +5 to +45C. A triple-division circuit is then developed from the single-stage divider concepts. This circuit is incorporated into a calibration instrument which produces pulses in a frequency range useful for time calibration of biologic data. When the instrument is used as a cardiotachometer calibrator, pulses are available from 30 to 300 pulses/min.; as a time marker, periods range from 50 msec. to 10 sec. The circuitry remains stable over a line voltage fluctuation of plus or minus 20% and a temperature range of -15 to +80C. The output pulse, available as either a negative or positive going pulse, is 8.33 msec. wide, has an amplitude greater than 10 v., has rise and fall times of the order of 10 microsec., and exhibits a typical timing accuracy of plus or minus 0.02%. (Author)

AD-631 223 Fld. 6/12
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF RADIO AND ELECTRICAL ENGINEERING
A RESPIRATORY AIR-COOLER FOR CARDIAC AND PULMONARY STUDIES.
Technical note,
by J. A. Hopps. 20 Apr 65, 4p.
NRC 8836

Unclassified report

Availability: Published in Medical and Biological Engineering v4 p87-89 1966. Copies to DDC users only.

Descriptors: (*Cooling + ventilating equipment, *Medical equipment), Respiration, Air, Cooling, Lungs, Heart, Canada, Diagnosis

AD-631 815 Fld. 6/12
BRITISH COLUMBIA UNIV VANCOUVER DEPT OF SURGERY RESEARCH LAB
A CONTROLLED BURNING APPARATUS BASED ON THE WEIGHT IMMERSION PRINCIPLE,
by A. D. Courtemanche. Jul 64, 7p. Contract DRB-9325-20,

Unclassified report

Availability: Published in British Journal of Plastic Surgery v19 n1 p23-29 Jan 1966. Copies to DDC users only.

Descriptors: (*Burns, Medical equipment), Heaters, Laboratory equipment, Laboratory animals, Body weight, Surface area, Canada

A controlled burning apparatus has been constructed and tested which makes possible the accurate prediction of the body surface area to be burned. With it the investigator can reproduce the same surface area burn in any required number of animals. Liquid conduction is used as the method of burning and the temperature and exposure time may be varied as required. The basis of the method is the close relationship that exists between the weight of a body immersed and the surface area immersed. This concept is not a new one and was graphically described by Bailey, Lewis, and Blocker in 1962. While reviewing their work, prior to commencing a burn research project, it became apparent to the writer that certain modifications of their apparatus would improve its function and accuracy. These changes are described in detail and are essentially related to the method of measuring the weight change of the immersed rat. Also described is a simple method of calculating surface area of rat pelts which does not require the use of a planimeter. Testing of the apparatus revealed a consistent correlation between weight immersed and surface area immersed. (Author)

6/13. MICROBIOLOGY

AD-631 205 Fld. 6/13
CFSTI Prices: HC $1.00 MF $0.50
SCHOOL OF AEROSPACE MEDICINE BROOKS AFB TEX
POTASSIUM TRANSPORT MUTANT OF ESCHERICHIA COLI B. ANALYSIS OF POTASSIUM MOVEMENTS.
Rept. for Jun 64-Dec 65,
by Raymond Damadian. Feb 66, 20p. Rept. no. SAM-TR-66-19,
Proj. AF-6302, Task 630207,

Unclassified report

Descriptors: (*Potassium, Osmosis), (*Escherichia coli, Cell structure), (*Cell structure, Transport properties), Mutations, Distribution, Electron microscopy, Biosynthesis, Methionine, Motion, Electrolytes (Physiology)

A second mutant of Escherichia coli B (strain RD-2) with impaired K transport was isolated with nitroguanidine as the mutagenic agent. Except for its K requirement, RD-2 manifests the same nutritional requirements as the parent strain and contrasts with RD-1, which was shown to be deficient both in K transport and in methionine biosynthesis. RD-2 will not grow in a low K media (20 micro M. K) which supports growth of the parent strain. Electron microscopic examination of the two strains reveals no differences in surface layer ultrastructure to account for the transport impairment. Potassium accumulation studies demonstrate that the mutant low K growth failure is attributable to a K accumulation impairment. In contrast to the parent strain, RD-2 cannot accumulate K from the low K media. Addition of K to a nonaccumulating low K suspension of RD-2 stimulates uptake of K, thus establishing viability of the cells. Measurement of low K steady-state tracer fluxes yields flux values for RD-2, which are one-third those of the parent strain, and the calculated influx rate constants are consistent with the interpretation that RD-2's accumulation failure is due to an influx impairment. (Author)

AD-631 215 Fld. 6/13, 6/1
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF BIOSCIENCES
COMPOSITION OF RIBOSOMES OF AN EXTREMELY HALOPHILIC BACTERIUM,
by S. T. Bayley. 15 Sep 65, 10p.
NRC 8849

Unclassified report

Availability: Published in J. Mol. Biol. v15 p420-7 1966. Copies to DDC users only.

Descriptors: (*Bacteria, Ribosomes), (*Ribosomes, Chemical properties), Proteins, Amino acids, Electrophoresis, Electrolytes (Physiology), Potassium, Magnesium, Canada

Amino acid analyses and electrophoresis on starch-urea gels demonstrated that the ribosomes of the extremely halophilic bacterium, Halobacterium cutirubrum, contain a majority of acidic pro-

teins with isoelectric points of about 3.9 and a smaller proportion of basic proteins with isoelectric points above about 8.5. From analyses of magnesium and potassium, it is concluded that magnesium ions probably stabilize the RNA moiety as in other ribosomes, and that potassium ions neutralize negative charges, thereby enabling the acidic proteins to be bound to the ribosomal RNA by hydrogen and hydrophobic bonds. The acidic and basic proteins are similar in amino acid composition except for the relative proportions of acidic to basic residues. The possible significance of this observation in relation to halophilism is discussed. (Author)

AD-631 216 Fld. 6/13
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF BIOSCIENCES
AUTORADIOGRAPHIC ANALYSIS OF REGIONAL CELL WALL GROWTH OF YEASTS,
by B. F. Johnson, and E. Jean Gibson. 17 Jun 65, 10p.
NRC 8852

Unclassified report

Availability: Published in Experimental Cell Research v41 p297-306 1966. Copies to DDC users only.

Descriptors: (*Yeasts, Cell wall), (*Cell wall, Growth), (*Autoradiography, Cell wall), Tritiated compounds, Glucose, Polysaccharides, Labeled substances, Canada

The rate of incorporation of 6-H3-glucose into an alkali -insoluble polysaccharide of the yeast cell wall was measured. The budding yeast, Pichia farinosa, incorporated primarily at the distal end of the bud, and the rate of incorporation at the end was a linear function of bud length (i.e., was exponential with time). This tip-growth of the bud was comparable with the primary end growth of the fission yeast, Schizosaccharomyces pombe. Only 16.4 per cent of the adults were labeled. An analysis of their labeling pattern indicated that about 12 per cent of the adults were labeled by a turnover mechanism, and the remainder of the labeled adults were in the process of initiating new buds. (Author)

AD-631 219 Fld. 6/13
PRAIRIE REGIONAL LAB SASKATOON (SASKATCHEWAN)
CONVERSION OF GLUTAMIC ACID TO VOLATILE ACIDS BY MICROCOCCUS AEROGENES,
by D. F. Horler, D. W. S. Westlake, and W. B. McConnell. 10 May 65, 7p.
NRC 8656

Unclassified report

Availability: Published in Canadian Journal of Microbiology v12 p47-53 1966. Copies to DDC users only.

Descriptors: (*Micrococcus, Metabolism), (*Glutamic acid, Metabolism), Amino acids, Tracer studies, Acetic acids, Carboxylic acids, Carbon dioxide, Labeled substances, Canada

Radiotracer studies confirm that the major products of glutamic acid metabolism by Micrococcus aerogenes are acetic acid, butyric acid, and carbon dioxide. When glutamic acid-1-C14 was used as tracer the carboxyl carbons of both acetic and butyric acid were highly radioactive. Carbon 3 of butyric acid also contained some carbon-14. Glutamic acid-2-C14 yielded acetic and butyric acid, both of which were highly labelled in carbon 2; carbon 4 of the butyric acid containing some carbon-14. All positions of acetic and butyric acid contained radioactivity when glutamic acid-3, 4-C14 was used but carbons 3 and 4 of butyrate were much more highly labelled than carbons 1 and 2. Glutamic acid-5-C14 was the only source of radioactive carbon dioxide. The data suggest that some of the butyric acid was derived from the intact four-carbon sequence which constitutes carbons 1, 2, 3, and 4 of glutamic acid and therefore, a pathway of glutamic acid degradation hitherto not recognized must occur in M. aerogenes. (Author)

AD-631 220 Fld. 6/13
PRAIRIE REGIONAL LAB SASKATOON (SASKATCHEWAN)
THE UTILIZATION OF FLAVONOID COMPOUNDS BY YEAST AND YEAST-LIKE FUNGI,
by D. W. S. Westlake, and J. F. T. Spencer. 12 Jul 65, 10p.
NRC 8683

Unclassified report

Availability: Published in Canadian Journal of Microbiology v12 p165-74 1966. Copies to DDC users only.

Descriptors: (*Yeasts, Metabolism), (*Fungi, Metabolism), (*Cryptococcus, Metabolism), (*Anthoxanthin pigments, Metabolism), Culture medium, Vitamin P, Glycosides, Phenols, Nutrition, Organic nitrogen compounds, Canada

Three hundred cultures of yeasts and yeast-like fungi were tested for their ability to metabolize flavonoid compounds. Rutin, quercitrin, taxifolin, and naringin were used by strains of Pullularia and by the asporogenous yeasts Cryptococcus albidus and Cryptococcus diffluens. Catechin and 5,7-dihydroxyisoflavone were not used by any of the cultures tested. The utilization of flavonoid compounds was dependent upon the nutritional complexity of the medium used. When a complex organic nitrogen source was used in the medium, not only were quercetin glycosides metabolized at a faster rate but yeasts, which were inactive on a synthetic medium, utilized varying amounts of the glycosides. The aglycone quercetin was utilized only in the presence of organic nitrogen compounds. Culture filtrates were inactive but cell-free extracts of a Pullularia sp. and of strains of C. albidus and C. diffluens degraded rutin, in the presence of air, to glucose, rhamnose, protocatechuic acid, phloroglucinol carboxylic acid, and carbon monoxide. The metabolism of flavonol glycosides by yeasts is discussed as a taxonomic characteristic and the pathway used is compared to the known microbiological routes for the utilization of these compounds. (Author)

AD-631 221 Fld. 6/13, 6/1
PRAIRIE REGIONAL LAB SASKATOON (SASKATCHEWAN)
THE ISOLATION OF PULCHERRIMINIC ACID FROM MICROCOCCUS VIOLAGABRIELLAE,
by J. C. MacDonald. 3 Jun 65, 5p.
NRC 8667

Unclassified report

Availability: Published in Canadian Journal of Microbiology v12 p55-9 1966. Copies to DDC users only.

Descriptors: (*Micrococcus, Organic pigments), (*Organic pigments, Chemical properties), Bacterial extracts, Separation, Purification, Spectra (Infrared), Acids, Canada

The production of pigmented cells of Micrococcus violagabriellae grown in shake cultures was studied. Pulcherriminic acid was isolated from the pigment and characterized. It was concluded that the insoluble red pigment obtained from the cells was pulcherrimin, identical with the pigment of Candida pulcherrima. (Author)

AD-631 403 Fld. 6/13, 6/15, 6/5
CFSTI Prices: HC $4.60 MF $0.50
HARRY S TRUMAN LAB KANSAS CITY GENERAL HOSPITAL MO
STUDIES ON EAST AFRICAN STRAIN OF P. FALCIPARUM; ELECTRON MICROSCOPY OF PLASMODIUM FALCIPARUM; THE COURSE OF PLASMODIUM BERGHEI INFECTION IN THE POLYCYTHEMIC MOUSE.
Progress rept. no. 3,
by Daniel C. Martin, John D. Arnold, Roger Ladda, and Frank Lalli. 1966, 42p. Contract DA-49-193-MD-2545,

Unclassified report

Contributions 49, 50 and 73 from the Army Research Program on Malaria.

Descriptors: (*Malaria, Infections), (*Plasmodium, Infections), (*Antimalarials, Effectiveness), Cinchona alkaloids, Therapy, Life cycle, Dosage, Erythrocytes, Electron microscopy, Microstructure, Parasites, Cell structure, Mice, Diseases

AD-631 541 Fld. 6/13
NAVAL MEDICAL RESEARCH INST BETHESDA MD DEPT OF PARASITOLOGY
THE FEEDING MECHANISM OF AVIAN MALARIAL PARASITES.
Medical research interim rept.,
by Masamichi Aikawa, Peter K. Hepler, Clay G. Huff, and Helmuth Sprinz. Apr 66, 21p.
NAVMED MR-005.09-1030.2-13

Unclassified report

Prepared in cooperation with Walter Reed Army Inst. of Research, Washington, D. C., Dept. of Experimental Pathology.

Availability: Published in The Journal of Cell Biology v28 n2 p355-73 1966. Copies to DDC users only.

Descriptors: (*Plasmodium, *Ingestion (Physiology)), Cytoplasm, Life cycle, Cell structure, Diseases, Hemosporidia, Erythrocytes, Membranes (Biology), Electron microscopy, Parasites

Electron microscope studies of the erythrocytic forms, including gametocytes and asexual schizonts, of the protozoa Plasmodium fallax, P. lophurae, and P. cathermerium, revealed a 'cytostome,'a specialized organelle of the pellicular membrane which is active in the ingestion of host cell cytoplasm. In material fixed in glutaraldehyde and postfixed in 0s04, the cytostome appears in face view as a pore limited by two dense circular membranes and having an inside diameter of approximately 190 millimicrons. In cross-section, the sytostome is a cavity bounded on each side by two dense segments corresponding to the two dense circles observed in face view; its base consists of a single unit membrane. In the process of feeding, the cytostome cavity enlarges by expansion of its membrane, permitting a large quantity of red cell cytoplasm to come into contact with the cytostome wall. Subsequent digestion of erythrocyte cytoplasm occurs exclusively in food vacuoles which emanate from the cytostome invagination. As digestion progresses, the food vacuoles initially stain more densely and there is a marked build-up of hemozoin granules. In the final stage of digestion, a single membrane surrounds a cluster of residual pigment particles and very little of the original host cell cytoplasm remains. (Author)

6/14. PERSONNEL SELECTION AND MAINTENANCE (MEDICAL)

AD-631 554 Fld. 6/14, 5/9
CFSTI Prices: HC $21.80 MF $1.25
NAVAL AEROSPACE MEDICAL INST PENSACOLA FLA
THE THOUSAND AVIATOR STUDY: DISTRIBUTIONS AND INTERCORRELATIONS OF SELECTED VARIABLES,
by Albert Oberman, Norman E. Lane, Robert E. Mitchell, and Ashton Graybiel. 1 Sep 65, 222p.
Rept. no. Monograph-12,

Unclassified report

Joint rept. conducted under the sponsorship of the Public Health Service and National Aeronautics and Space Administration, NASA Order-R-136.

See also AD-625 854.

Descriptors: (*Medical examination, Naval personnel), (*Naval personnel, Selection), (*Aviation personnel, Selection), Psychometrics, Training, Anthropometry, Vision, Audiometry, Neurology, Aviation medicine, Statistical analysis

The 1963-1965 evaluation in the Pensacola Thousand Aviator Study was the third follow-up examination ina longitudinal study of 1056 Naval aviators. The original study was carried out in 1940, and subsequent examinations were performed in 1951 and 1957. During the 1963 examination, a large body of physiological, psychological and personal history data was collected on 675 surviving members of the original population. Because of the magnitude and diversity of this information, an over-all view of distributions and interrelationships seems necessary for (1) providing assistance in understanding the findings of the study, and (2) indicating possible areas of further research by facilitating the discovery of relationships not otherwise apparent. This report describes in detail the distributions and intercorrelations of 100 variables selected from the measures obtained during the 1963 follow-up examination. Data are presented in the form of descriptive statistics, frequency histograms, and Pearson correlation coefficients. Comments deal exclusively with statistical considerations, and no interpretations are attempted. (Author)

6/15. PHARMACOLOGY

AD-631 403 See Fld. 6/13

6/16. PHYSIOLOGY

AD-631 207 Fld. 6/16, 6/19
CFSTI Prices: HC $1.60 MF $0.50
SCHOOL OF AEROSPACE MEDICINE BROOKS AFB TEX
RECOVERY OF VISUAL DISCRIMINATION AFTER HIGH INTENSITY FLASHES OF LIGHT,
by Sanford L. Severin. Dec 61, 12p. Rept. no. 62-16,

Unclassified report

Descriptors: (*Flashblindness, Adaptation (Physiology)), (*Visual acuity, Stress (Physiology)), Vision, Light, Recovery, Medical equipment, Intensity

A new technic for the study of flash blindness is described, utilizing the Meyer-Schwickerath Zeiss light coagulator as a source of high intensity light flashes. Four subjects were exposed to illuminations ranging from 645 lux to 56,180 lux as measured at the corneal plane. Recovery was measured as the period of time required after dazzle to regain sufficient visual discrimination to perceive testing luminances of 0.06 ft.--L. and 0.013 ft.--L. The experimental results are discussed, and the potential of this apparatus in studying the phenomenon of flash blindness is emphasized. (Author)

AD-631 360 Fld. 6/16
CFSTI Prices: HC $1.60 MF $0.50
HUMAN ENGINEERING LABS ABERDEEN PROVING GROUND MD
MIDDLE-EAR MUSCLE EFFECTS ON LOW-INTENSITY SOUNDS.
Technical memo.,
by G. Richard Price. Nov 65, 18p. Rept. no. TM-16-65,

Unclassified report

Descriptors: (*Vestibular apparatus, *Muscles), (*Hearing, Vestibular apparatus), Intensity, Sound, Auditory perception

Experiments in which loudness judgments were made for a tone in one ear while another tone was present in the opposite ear have questioned the role played by the middle -ear muscles. Loudness judgments probably involve both central and peripheral factors. In order to evaluate the peripheral factors, cochlear potentials were measured on 12 lightly anesthetized cats. There were changes in the cochlear potential to pure tones in one ear (ranging in frequency from 0.2 to 10 kilocycles) from middle-ear muscle activity elicited by contralateral two-second pure-tone bursts (ranging from 0.65 to 5 kilocycles) as the tones producing the cochlear potentials were varied in intensity. As the intensity of the measured tone was varied, the size of the effect (in dB) remained constant. (Author)

AD-631 487 Fld. 6/16
CFSTI Prices: HC $3.00 MF $0.50
HAMILTON STANDARD DIV UNITED AIRCRAFT CORP WINDSOR LOCKS CONN
CORRELOGRAPHIC ANALYSIS OF AFFERENT AND EFFERENT ACTIVITY DURING THE JERK REFLEX.
Final rept. May 64-Jun 65,
by James U. Casby, and Nils A. Normann. Dec 65, 53p. Contract AF 33 (615)-1783, Proj. AF-7233, Task 723304,
AMRL TR-65-171

Unclassified report

Descriptors: (*Neuromuscular transmission, Analysis), (*Reflexes, Neuromuscular transmission), Legs, Joints (Physiology), Nerve fibers, Muscles

Cross-correlation techniques were applied to an analysis of the afferent and efferent nerve traffic associated with the ankle jerk reflex. Primary afferent, secondary afferent and Golgi tendon fiber activity could be detected and monitored and the time course of their activity is shown. The alpha efferent activity could be monitored also and is displayed. The technique was not adequate to show the time course of the gamma efferent activity but some indications of its activity are displayed. (Author)

AD-631 548 Fld. 6/16, 6/5, 6/19
EMORY UNIV ATLANTA GA SCHOOL OF MEDICINE
CARDIOVASCULAR RESPONSES IN PROLONGED HYPOTHERMIA,
by V. P. Popovic, and Kenneth M. Kent. 5 Apr 65, 6p. Contract DA-49-193-MD-2432 ,PHS-GM-09652

Unclassified report

Supported in part by grant CA-06311 from the National Cancer Institute.

Availability: Published in The American Journal of Physiology v209 n6 p1069-74 Dec 1965. Copies to DDC users only.

Descriptors: (*Hypothermia, *Cardiovascular system), Survival, Oxygen consumption, Rats, Blood pressure

Rats cooled to a body temperature of 15 C live for 9-10 hr. However, they do not survive the rewarming if the hypothermia has lasted more than 5 hr. Neither the cause of death in hypothermia after 10 hr, nor the cause of resuscitation failure of animals rewarmed after 5 hr in hypothermia is known. In 3 L.rats cooled to and maintained at a body temperature of 15 C. cardiac output decreased continually during the entire period of hypothermia, having by the end of hypothermic survival the value of only 25% of output at the beginning of the hypothermic period. The arteriovenous differences of O2 content increased, while total peripheral resistance increased continuously during this time. During the 10 hr of hypothermic survival the hematocrit ratio rose from 42 to 65-70 vol %. Because of these changes it is suggested here that the failure of circulation is the probable cause of death in hypothermia. (Author)

AD-631 637 Fld. 6/16, 6/5
CFSTI Prices: HC $6.00 MF $1.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
PROBLEMS OF THE PHYSIOLOGY AND PATHOLOGY OF THE HIGH MOUNTAINS.
4 Jan 66, 271p. Rept. no. FTD-TT-65-1320, TT 66-61111

Unclassified report

Voprosy Fiziologii i Patologii Vysokogorya, Unedited rough draft trans. of Tadzhikskii Meditsinskii Institut, Dashanbe. Trudy (USSR) v62 195p 1963.

Descriptors: (*High altitude, Medicine), (*Pathology, High altitude), (*Physiology, High altitude), Mountains, Acclimatization, Hypoxia, Cardiovascular system, Vitamins, Nervous system, Psychiatry, Blood chemistry, USSR

AD-631 675 Fld. 6/16, 6/19
CFSTI Prices: HC $1.00 MF $0.50
SAINT LOUIS UNIV MO DEPT OF PHYSIOLOGY
IMPEDANCE MEASUREMENTS OF CARDIAC OUTPUT DURING MODERATE HEAT EXPOSURE.
Final rept., May 63-Jul 65,
by Bernell Coleman, Alrick B. Hertzman, Louis S. D'Agrosa, and Franz Flath. Feb 66, 23p. Contract AF 33 (657)-11551, Proj. AF-7164, Task 716409,
AMRL TR-66-5

Unclassified report

Descriptors: (*Electrocardiography, Exposure), (*Electrical impedance, Heart), Heat, Measurement, Pulse rate, Skin, Blood vessels, Humans, Dogs, Stress (Physiology)

Cardiac outputs of nude resting subjects were estimated from measurements of the intrathoracic impedance pulses as recorded with the four electrode system. Ambient temperature was increased from 28C to 43C. Increases in cardiac output were small, (about 1.0 L/sq.m./min) variable, and due to small increases in heart rate and stroke volume. The greater cardiac output during heat was probably due to the cutaneous vasodilatation as demonstrated in the cutaneous opacity pulses, but this relation was not demonstrated decisively. The ratio of increase in cardiac output to sweating was about the same as that shown previously for cutaneous blood flow and sweating. A decrease occured in intrathoracic impedance indicating a greater volume of electrolyte fluid in this area. Validation of the thoracic impedance pulses as a measure of right ventricular stroke volume was accomplished in human and canine subjects. (Author)

AD-631 279 See Fld. 12/2

AD-631 294 See Fld. 15/5

AD-631 735 See Fld. 6/19

6/17. PROTECTIVE EQUIPMENT

AD-631 493 Fld. 6/17
CFSTI Prices: HC $3.00 MF $0.50
AVIATION SAFETY ENGINEERING AND RESEARCH PHOENIX ARIZ
IMPACT TEST METHODS AND RETENTION HARNESS CRITERIA FOR U. S. ARMY AIRCREWMAN PROTECTIVE HEADGEAR.
Final technical rept.,
by Joseph L. Haley Jr., and James W. Turnbow. Mar 66, 55p. Rept. no. AvSER-65-15, Contract DA-44-177-AMC-254 (T) Task 1P125901A14230,
USAAVLABS TR-66-29

Unclassified report

Descriptors: (*Helmets, Military requirements), (*Fastenings, Helmets), Impact tests, Test methods, Army equipment, Army personnel, Design, Drop testing, Aviation personnel, Headgear

On the basis of simple analyses and some experimental testing, recommendations are made for the design and testing of helmet retention harnesses. A 'collar-type' retention harness is recommended, and two tests are suggested as a method of insuring a good design. Impact tests were conducted by an impactor-drop method and a head-form drop method. These test methods employ one movable piece and one fixed piece rather than two movable pieces as are currently used by most test agencies. On the basis of the impact test results, it is recommended that the impactor-drop method be used for the qualification of U. S. Army aircrew helmets. Probable head impact velocities and impact surfaces are discussed, and impact test conditions are specified. (Author)

6/18. RADIOBIOLOGY

AD-631 206 Fld. 6/18
CFSTI Prices: HC $1.00 MF $0.50
NORTHROP SPACE LABS HAWTHORNE CALIF
A STUDY OF FLUORESCENT PRODUCTS IN THE URINE OF RATS EXPOSED TO IONIZING RADIATION.
Progress rept. Nov 64-Oct 65,
by James A. Demetriou, and Frank M. Maciasr. Feb 66, 20p. Contract AF 41 (609)-2679, Proj. AF-7757, Task 775702, SAM TR-66-13

Unclassified report

Descriptors: (*Radiation effects, Organic compounds), (*Metabolism, Radiation effects), Urine, Fluorescence, Rats, Radiobiology, Thin layer chromatography, Gels

The excretion of fluorescent products in the urines of nonirradiated rats and rats exposed to a lethal dose of ionizing radiation was investigated. Fractionation of the urine extracts by gel filtration chromatography yielded eleven fluorescent fractions. Several fractions in the urines of the irradiated animals showed marked decreases in total fluorescence. A new fluorescent fraction was found exclusively in the post-irradiation urines. In addition, other differences between the irradiated and nonirradiated animals were found by means of thin-layer chromatography. (Author)

AD-631 232 Fld. 6/18
CFSTI Prices: HC $1.00 MF $0.50
SOUTHWEST RESEARCH INST SAN ANTONIO TEX DEPT OF PHYSICAL AND BIOLOGICAL SCIENCES
GAS CHROMATOGRAPHIC ANALYSIS OF BODY FLUIDS FOLLOWING MIDLETHAL IRRADIATION.
Final rept.,
by Arthur L. Gross, and George K. Kibler. 15 Dec 65, 14p. Contract AF 41 (609)-2676, Proj. 05-1630, Task 775702,

Unclassified report

Descriptors: (*Radiation effects, Body fluids), (*Body fluids, Chromatographic analysis), Gas chromatography, Rats, Blood, Urine, Amino acids, Monkeys

The program was organized to utilize existing gas chromatographic procedures in current use at the laboratories of Southwest Research Institute for screening a large number of chemical substances to determine what alterations result from radiation exposure. Rats were irradiated, blood or urine was collected from the animals, and gas chromatographic analyses were performed using three different methods. During the last quarterly period of the program monkeys were used as the experimental animals. They were irradiated and blood samples periodically taken from the animals were analyzed for amino acids.

AD-631 589 Fld. 6/18, 18/4
CFSTI Prices: HC $2.00 MF $0.50
ARMED FORCES RADIOBIOLOGY RESEARCH INST BETHESDA MD
EXPERIMENTAL DETERMINATION OF DOSE FOR THE MONKEY IN A REACTOR PULSE ENVIRONMENT.
Scientific rept.,
by J. H. Dowling. Feb 66, 39p. Rept. no. AFRRI-SR-66-3,

Unclassified report

Descriptors: (*Whole body irradiation, Monkeys), Dosage, Dosimeters, Fast neutrons, Gamma rays, Thermal neutrons, Ionization chambers, Radiation measurement systems, Determination, Nuclear reactors

A study was made of a series of pulse exposures of the monkey using a pulsing TRIGA reactor. The reported doses are based on the kerma calculated from threshold foil data for fast neutrons and the gamma exposure determined by silver activated glass rods. These values were compared with extrapolated (by monitoring sulfur) values determined using tissue equivalent ionization chambers for total dose, a Hurst proportional counter for fast neutron dose, and a graphite - CO2 ionization chamber and a tetrachloroethylene chemical dosimeter for gamma dose. (Author)

AD-631 617 Fld. 6/18, 7/4
MOORE SCHOOL OF ELECTRICAL ENGINEERING UNIV OF PENNSYLVANIA PHILADELPHIA
ON THE ORIENTATION OF NONSPHERICAL PARTICLES IN AN ALTERNATING ELECTRICAL FIELD,
by Gerhard Schwarz, Masao Saito, and Herman P. Schwan. 6 Jul 65, 10p. Rept. no. 1, Contract Nonr-551 (52) ,PHS-5R01HE-01253-13

Unclassified report

Availability: Published in The Journal of Chemical Physics v43 n10 p3562-9 Nov 15 1965. Copies to DDC users only.

Descriptors: (*Cells (Biology), Radiation effects), (*Particles, Electric fields), Microwaves, Alternating current, Dielectric properties, Colloids, Electrolytes (Physiology), Electrical conductance, Frequency, Membranes, Ellipsoids

It is shown in general that any nonspherical particle imbedded in a medium with a different complex dielectric constant will experience orienting forces from an impressed alternating electrical field. The direction of stable orientation is determined by the geometry of the particle, by the dielectric properties of the material involved, and also by the frequency of the field. A continuous change of frequency may result in a continuous rotation of the particle as well as in a sudden 'turnover' covering an angle of 90 deg. The case of an ellipsoid suspended in an isotropic medium is discussed in more detail. If the complex dielectric constant of the ellipsoid can be represented by a tensor with principal axes coinciding with the geometrical axes, the direction of stable orientation always is given by one of these axes. However, the choice of 'stable axis' may be frequency dependent, so that turnover effects may occur as the frequency is changed. Such behavior is possible even if the dielectric properties of the ellipsoid are isotropic. Similar effects are displayed by a system approximating the passive electrical properties of biological cells in an electrolyte solution, thus accounting for some unusual experimental observations of this kind. (Author)

AD-631 661 Fld. 6/18
CFSTI Prices: HC $3.00 MF $0.75
ARMED FORCES RADIOBIOLOGY RESEARCH INST BETHESDA MD
INCAPACITATION IN THE MONKEY (MACACA MULATTA) FOLLOWING EXPOSURE TO A PULSE OF REACTOR RADIATIONS.
Scientific rept.,
by Leslie J. Seigneur, and James T. Brennan. Feb 66, 58p. Rept. no. AFRRI-SR-66-2,

Unclassified report

Descriptors: (*Whole body irradiation, Monkeys), (*Monkeys, Radiation injuries), Dose rate, Mortality rates, Nuclear reactors, Electromagnetic pulses

One hundred and thirty-one monkeys (Macaca mulatta) were exposed to scheduled doses of 2,500 through 80,000 rads of pulsed reactor radiations using a TRIGA reactor. The animals were observed with respect to survival time, and time to permanent complete incapacitation. Additional observations of a clinical nature were made during the postirradiation course. An early transient phase of incapacitation lasting from 5 to 30 minutes was noted at dose levels from 2,500 through 30,000 rads. This was followed by a 'plateau' of recovered ability to respond, the duration of the plateau being inversely related to dose. With scheduled doses in the range from 40,000 through 80,000 rads, the plateau phenomenon was suppressed, partial recovery did not usually occur, and the early incapacitation was rapid, progressive, and irreversible. The radiological physics and dosimetry support required for this experiment is reported in detail in AD-631 589. (Author)

AD-631 690 Fld. 6/18
CFSTI Prices: HC $3.00 MF $0.75
BATTELLE MEMORIAL INST RICHLAND WASH
LONG-TERM STUDY OF INHALED PLUTONIUM IN DOGS.
Technical rept., 1 Sep 59-30 Apr 65,
by William J. Bair, James F. Park, and William J. Clarke. Mar 66, 62p. Contract AF 29 (601)-62-1507, Proj. AF-5710, AFWL 65-214

Unclassified report

Descriptors: (*Plutonium, *Radiation effects), Dogs, Diffusion, Respiration, Lungs, Deposition, Autoradiography, Cardiovascular system, Pathology

To determine the long-term translocation and biological effects of inhaled plutonium, 40 beagle dogs were given a single 10- to 30-min exposure to (Pu (239)02 aerosols. Thirteen dogs died or were sacrificed when clinical signs indicated death was imminent 29 to 66 months postexposure. The body burdens at death ranged from 0.5 to 3 micro Ci with 40 to 75 per cent of the body burden in the lungs, and 20 to 50 per cent in the bronchial and mediastinal lymph nodes. The liver contained 2 to 21 per cent, and the skeleton, 1 to 7 per cent. Cardiopulmonary insufficiency and lymphopenia were the primary clinical signs. Pathology in the lungs consisted of severe fibrosis followed by alveolar cell hyperplasia, and bronchiolar and squamous types of metaplasia. Seven of the 13 animals showed bronchiolo-alveolar carcinomas, an incidence of 18 per cent as compared to a reported canine primary lung-tumor incidence of 0.2 per cent. The bronchial lymph nodes were composed of dense sclerotic connective tissue devoid of any lymphoid element. Metastases of the pulmonary tumor to the bronchial lymph nodes were seen in three animals. Twenty-three dogs with body burden of 0.3 to 1 micro Ci survived 4 to 6 yr after exposure. (Author)

AD-631 742 Fld. 6/18, 9/1
CFSTI Prices: HC $4.00 MF $0.75
BATTELLE MEMORIAL INST COLUMBUS OHIO
STUDY OF SEMICONDUCTOR FAST-NEUTRON DOSIMETER FOR RANGE 0-50, 000 RADS.
Final summary rept.,
by Gordon Kramer, W. H. Closser, and O. J. Mengali. Apr 66, 106p. Contract DA-18-108-405-CML-1031 ,DA-18-035-AMC-298 (A) NDL TR-55

Unclassified report

Descriptors: (*Dosimeters, Fast neutrons), (*Semiconductor devices, Dosimeters), Silicon, Semiconductors, Performance (Engineering)

Results of a study of a semiconductor neutron dosimeter for the range 0 to 50,000 rads are presented. The dosimeter is a wide-base, conductivity-modulated, silicon p-n junction whose forward resistance increases upon exposure to neutrons, because of a decrease in excess carrier lifetime. The relationship between bulk properties of silicon, various processing steps, base width, and forward-current level on dosimeter performance was studied. The results of this study have led to development of an improved device for the required application. Advances in the dosimeter-fabrication process have led to increases in device uniformity. The need for adequate process control to prevent material contamination is emphasized. Lifetime degradation in the completed dosimeter and consequently higher response threshold has been attributed directly to the thermal-diffusion cycle, and a reduction in the temperature and time in this step is suggested to improve the sensitivity at lower neutron fluences. Present dosimeter response is accurate to plus or minus 25 percent at 50 rads (tissue) and improves rapidly at higher doses to plus or minus 2 percent at 50,000 rads (tissue). Long-term annealing effects at room temperature are shown to be negligible for dosimeter application. (Author)

AD-631 319 See Fld. 18/4

AD-631 529 See Fld. 18/8

AD-631 684 See Fld. 18/6

6/19. STRESS PHYSIOLOGY

AD-631 457 Fld. 6/19, 5/10
CFSTI Prices: HC $3.00 MF $0.75
HUGHES AIRCRAFT CO CULVER CITY CALIF
HUMAN PERFORMANCE UNDER RANDOM AND SINUSOIDAL VIBRATION.
Final rept., Apr 64-May 65,
by A. Z. Weisz, Connie Goddard, and R. W. Allen. Dec 65, 61p. Contract AF 33(615)-1908, Proj. AF-1710, Task 171002,
AMRL TR-65-209

Unclassified report

Descriptors: (*Performance (Human), *Vibration), Stress (Physiology), Tracking, Visual perception, Auditory perception, Acceleration

Two experiments tested human subjects under whole-body vertical vibration to (1) compare effects on performance of 5 cps sinusoidal, 5 cps random amplitude, and 4-12 cps random vibration equated on the basis of power, and (2) determine acceleration levels at which significant performance decrements are found for each type of vibration. The complex experimental task required two-dimensional compensatory tracking, visual monitoring, and auditory monitoring during 20-minute vibration exposures at levels equated to 5, 15, 25, and 30 percent of the 1-minute human tolerance values for 5 cps sinusoidal vibration. Performance decrements under vibration were restricted to tracking, the most demanding component of the task complex. Tracking performance deteriorated with increasing acceleration levels of each type of vibration. Overall performance differences associated with the different types of vibration equated on the basis of power were not significant. A number of task and procedural variables, including task difficulty, work-rest cycle, and prior experience appear to be important determinants of performance capabilities and fatigue effects found in vibration studies, indicating a need for further investigation of these variables. (Author)

AD-631 735 Fld. 6/19, 6/16
CFSTI Prices: HC $3.00 MF $0.75
DELAWARE UNIV NEWARK
THE EFFECT OF ASCORBIC ACID SUPPLEMENTATION AND ACCLIMATIZATION TO COLD ON THE ELECTROCARDIOGRAM OF THE GUINEA PIG EXPOSED TO COLD.
Progress rept.,
by Charles G. Wilber, and Frances Zeman. Mar 66, 91p. Contract DA-49-193-MD-2627,

Unclassified report

Prepared in cooperation with California Univ., Davis.

Descriptors: (*Acclimatization, Cardiovascular system), (*Cardiovascular system, Exposure), (*Ascorbic acid, Cardiovascular system), Guinea pigs, Stress (Physiology), Survival, Electrocardiography, Statistical data

Guinea pigs were exposed until death in a cold chamber kept a 4 to 5C. Some of the guinea pigs were previously acclimatized to 22C and to 8C, respectively. Some were given vitamin supplements of 30 or 300 mg per kg ascorbic acid, others were given no vitamin supplement. Electrocardiograms were taken for all animals exposed. Measurements of the various intervals on the electrocardiograms including the heart rate indicated that the various treatments had no effect on the response of the heart to the cold. (Author)

AD-631 811 Fld. 6/19, 6/5, 5/10
CFSTI Prices: HC $1.10 MF $0.50
NAVAL AEROSPACE MEDICAL INST PENSACOLA FLA
CATALOG OF SCIENTIFIC PUBLICATIONS, SUPPLEMENT 2.
31 Dec 65, 10p.

Unclassified report

See also AD-618 889.

Descriptors: (*Aviation medicine, Indexes), Periodicals, Catalogs, Bibliographies, Reports, Biochemistry, Physiology, Radiology, Space medicine, Space biology, Psychophysiology, Psychology, Pathology, Naval personnel, Medical research

AD-631 207 See Fld. 6/16

AD-631 429 See Fld. 5/1

AD-631 548 See Fld. 6/16

AD-631 675 See Fld. 6/16

6/20. TOXICOLOGY

AD-631 483 Fld. 6/20, 21/9, 13/12
CFSTI Prices: HC $2.00 MF $0.50
OREGON STATE UNIV CORVALLIS RADIATION CENTER
EXPOSURES OF BIOLOGICAL SYSTEMS TO INORGANIC FLUORIDE OXIDIZING AGENTS. VOLUME I. HANDLING AND EXPOSURE TECHNIQUES.
Final rept., 1 Jul 64-30 Jun 65,
by Frank N. Dost, Donald J. Reed, and Chih H. Wang. Dec 65, 28p. Contract AF 33(615)-1799, Proj. AF-6302, Task 630202,
AMRL TR-65-223-VOL-I

Unclassified report

Descriptors: (*Oxidizers, Exposure), (*Fluorides, Exposure), Poisonous gases, Handling, Concentration (Chemistry), Flowmeters, Compatibility, Safety, Stability, Laboratory animals, Laboratory equipment, Hazards, Fluoroamines, Chlorine compounds, Bromine compounds, Oxygen compounds

A system adaptable for diluting and distributing various inorganic fluoride oxidizing agents was developed. Known dilutions of these agents in nitrogen air are generated on the basis of flow rate ratios between undiluted gas and various diluent gases, and confirmed chemically. Problems of materials compatibility, personnel protection, stability of the agents and exposure system design are discussed. (Author)

AD-631 688 Fld. 6/20
DEFENCE RESEARCH MEDICAL LABS TORONTO (ONTARIO)
DEVELOPMENT OF A STRAIN OF RATS WITH GREATER THAN NORMAL SUSCEPTIBILITY TO OXYGEN POISONING.
Research paper,
by J. D. Wood. 24 Aug 65, 7p. Rept. no. DRML-RP-613,

Unclassified report

Availability: Published in Canadian Journal of Physiology and Pharmacology v44 p259-65 1966. Copies to DDC users only.

Descriptors: (*Rats, Genetics), (*Toxic tolerances, *Oxygen), Reproduction (Physiology), Pressure, Poisoning, Mortality rates, Canada

Male and female rats of the Wistar strain were exposed to oxygen at high pressure (OHP) once per week for 3 weeks. Based on the incidence and severity of the convulsions observed, animals were selected which were considered the most susceptible and most resistant to oxygen poisoning. The animals were mated and the offspring exposed to OHP. The rats from susceptible parents were more than normally susceptible to oxygen poisoning as gauged by time until onset of convulsions, incidence and severity of convulsions, and mortality. The animals from resistant parents were no more tolerant of OHP than were the randomly selected rats of the parent generation. Similar results were observed with a third generation of rats obtained by mating second generation susceptible and resistant animals respectively. (Author)

Field 7-CHEMISTRY

7/1. CHEMICAL ENGINEERING

AD-631 281 Fld. 7/1, 11/8
CFSTI Prices: HC $1.60 MF $0.50
ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER WASHINGTON D C
STUDY WITH THE VIEW TO DEVELOPING RATIONAL TECHNOLOGICAL PROCEDURES FOR THE PRODUCTION OF ESSENTIAL OIL FROM STAR ANISE FRUIT,
by Nguen Nang Vinh, and A. F. Polyakov. Mar 66, 15p. Rept. no. FSTC-HT-23-32-66, Proj. 2301-6553,
TT 66-61051

Unclassified report

Trans. of Izvestiya Vysshikh Uchebnykh Zavedenii Pischchevaya Tekhnologiya (USSR) n4 (47) p68-73 1965.

Descriptors: (*Oils, Distillation), (*Fruits, Oils), Seeds, Odors, USSR, Steam

Methods for the production of essential oil of the fruit of star anise by steam distillation were studied with the view to developing a satisfactory technological process. The effects of the degree of disintegration of the fruit on the yield of oil, the length of time of distillation, and the amount of steam used were determined. A procedure is proposed whereby steam distillation is first carried out at atmospheric pressure and than at a higher pressure (2--6 atm) or with superheated steam. (Author)

7/2. INORGANIC CHEMISTRY

AD-631 195 Fld. 7/2, 7/4
CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF THE AEROSPACE AND MECHANICAL ENGINEERING SCIENCES

A REDETERMINATION OF THE INTEGRATED INTENSITY OF THE 15 MICRON BANDS OF CARBON DIOXIDE,
by P. Varanasi, and J. L. Lauer. 30 Jul 65, 4p.
Contract Nonr-2216 (00), Proj. NR-015 401,
Unclassified report

Availability: Published in J. Quant. Spectrosc. Radiat. Transfer. v6 p127-30 1966. Copies to DDC users only.

Descriptors: (*Carbon dioxide, Band spectrum), (*Band spectrum, Intensity), (*Infrared spectroscopy, Carbon dioxide), Pressure, Measurement

The integrated intensity of the 15 micron bands of carbon dioxide at room temperature was determined by the self-broadening technique using gas pressures up to 10 atm. Great care was taken to eliminate stray light and to measure the geometric cell length at every pressure. A value of 200 plus or minus 10/sq cm/atm was obtained. (Author)

AD-631 222 Fld. 7/2
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF APPLIED CHEMISTRY
DIRECT DETERMINATION OF SMALL QUANTITIES OF RARE EARTH AND YTTRIUM OXIDES IN THORIA BY EMISSION SPECTROSCOPY,
Revised ed.,
by A. Mykytiuk, D. S. Russell, and S. S. Berman.
22 Apr 65, 11p.
NRC 8817
Unclassified report

Revision of Manuscript submitted 2 Nov 1964.

Availability: Published in Talanta v13 p175-84 1966. Copies to DDC users only.

Descriptors: (*Thorium compounds, Oxides), (*Rare earth compounds, Oxides), (*Yttrium compounds, Oxides), Chemical analysis, Spectroscopy, Emissivity, Neodymium compounds, Samarium compounds, Cerium compounds, Lanthanum compounds, Praesodymium compounds, Silver compounds, Chlorides, Distillation, Canada

Methods are proposed for the determination of submicrogram quantities of rare earth and yttrium oxides in thorium oxide by emission spectroscopy, without previous separation or concentration of these oxides in the sample. It is possible to volatilise these refractory materials from the thoria using silver chloride as the carrier. The carrier distillation technique in conjunction with relatively high dispersion spectroscopy (0.8-1.1A/mm) makes possible analyses at levels which were previously only feasible by preconcentration methods (e.g., La2O3 and Y2O3, 5 ppm; Nd2O3 and Sm2O3, 10 ppm; CeO2 and Pr6O11, 20 ppm in a 10-mg sample of ThO2).

AD-631 282 Fld. 7/2
CFSTI Prices: HC $1.00 MF $0.50
COLORADO UNIV BOULDER
HALOGENOID COMPLEXES.
Final technical rept.,
by Raymond N. Keller. Apr 66, 10p. Contract DA-ARO (D)-31-124-G198, Proj. 3292-C, AROD 3292:5
Unclassified report

Descriptors: (*Complex compounds, Chemical properties), (*Inorganic acids, Dissociation), Azides, Selenium compounds, Cyanides, Carbonates, Cyanates, Reaction kinetics, Cobalt compounds, Mercury compounds, Platinum compounds

A summary is given of work involving the chemistry of the following halogenoid or pseudo-halide ions: azide (N3 (-)), selenocyanate (SeCN (-)), azidodithiocarbonate (SCSN3 (-)), and cyanate (NCO (-)). The emphasis of the research was to determine to what extent the pseudo-halide ions could act as ligands in coordination complexes and the general nature of the resulting compounds. Dissociation constants were obtained for the acids HCN, HN3, HOCN, HSCN, and HSeCN. (Author)

AD-631 283 Fld. 7/2, 20/13
CFSTI Prices: HC $1.00 MF $0.50
CALIFORNIA UNIV DAVIS
HEAT TRANSFER IN POROUS MEDIA.
Final rept.,
by J. M. Smith. 5 Apr 66, 4p. Contract DA-ARO (D)-31-124-G191, Proj. 3235-E AROD 3235:13
Unclassified report

Descriptors: (*Catalysts, Heat transfer), (*Porous materials, Heat transfer), Diffusivity, Diffusion, Thermal diffusion, Thermal conductivity, Pellets

The purpose of the investigation was to study the thermal and diffusion characteristics of porous solid materials used as catalysts or catalyst carriers. It is now possible to estimate reasonably well the diffusivity in a porous catalyst using a random pore model. The method is summarized in a publication resulting from work on this project entitled 'Diffusion in Catalyst Pellets' published in Chemical Engineering Science Vol. 17, Page 825 (1962). A paper presenting the experimental measurements of thermal conductivity was published in The Journal of Chemical Engineering Data, Vol. 8, Page 54 (1963).

AD-631 343 Fld. 7/2, 7/4
CFSTI Prices: HC $3.00 MF $0.75
BOSTON COLL CHESTNUT HILL MASS
A COMPARATIVE STUDY OF THE SPECTROCHEMICAL ANALYSIS OF A COPPER BASE SOLUTION BY THE INTENSITY LINE RATIO, THE LINE WIDTH AND THE AREA RATIO METHODS.
Final rept., pt. 2, 1 Oct 64-1 Apr 65,
by James J. Devlin, and James F. Waterbury. 23 Aug 65, 66p. Contract AF 19 (604)-8819, Proj. AF-5620, Task 562003, AFCRL 65-855-Pt-2
Unclassified report

Descriptors: (*Copper, Spectroscopy), (*Line spectrum, Copper), Solutions, Impurities, Lead, Zinc, Tin, Concentration (Chemistry)

The precision of spectrochemical analysis declines in proportion to the increase in concentration of impurities for which an analysis is sought. This study endeavored to discover of it was possible to increase the precision for a copper base metal for higher percentages of lead, zinc and tin. A solution technique was followed since this at once offered the most reliable approach to preparing standards and because segregation opposes a reproducible result. Three methods of reducing the data of a large number of line pairs were followed, namely, the Intensity Ratio, the Line Width and the Integrated Area Ratio methods. The accummulated data shows little advantage to using the Line Width and the Integrated Ratio Methods over the Line Intensity Ratio Method when lower concentrations are investigated. As the concentrations increase however, a marked decrease in the coefficient of variation results from using the Integrated Ratio Method. This increased precision is accompanied by additional time and effort in preparing working curves. After a curve is established, on the other hand, the method consumes a little more time than presently used methods. (Author)

AD-631 398 Fld. 7/2
CFSTI Prices: HC $2.60 MF $0.50
TULANE UNIV NEW ORLEANS LA
PHYSICAL AND PREPARATIVE STUDIES OF MOLYBDENUM AND TUNGSTEN COMPLEXES.
Scientific interim rept., Dec 64-Nov 65,
by Ronald D. Archer. Jan 66, 27p. Contract AF 33 (615)-1043, Proj. AF-7023, Task 702302, ARL 66-0015
Unclassified report

Descriptors: (*Molybdenum compounds, Complex compounds), (*Tungsten compounds, Complex compounds), (*Complex compounds, Synthesis (Chemistry)), Quinolines, Chelate compounds, Pyridines, Oxides, Organic sulfur compounds, Ethylenediamine, Photochemistry, O-heterocyclic compounds, Iron compounds, Potassium compounds, Molecular isomerism, Spectroscopy

Several new molybdenum complexes containing chelated 8-hydroxy-quinolinato ligands, including (MoCl (C5H5N) (C9H6NO)2) and (MoCl2 (C5H5N)2 (C9H6NO) and three oxomolybdenum (V) derivatives were prepared and studied. A cationic molybdenum (III) species containing chelated ethylenediamine and a cationic tungsten (IV) species containing chelated 2,2 (1)-bipyridine were also synthesized. Other preparative studies included photochemical investigations with tungsten (IV). The complex formerly designated as K2MoCl5H2O by other workers was shown to have less than enough potassium for such a formula, the spectra of K3MoCl6 as currently in the literature has been shown to be incorrect, and the apparent discrepancy in the literature concerning the tetrazole complex Fe (C2F3N4)2.2H2O was explained. (Author)

AD-631 593 Fld. 7/2, 7/4
CFSTI Prices: HC $1.60 MF $0.50
AUBURN UNIV ALA
A STUDY OF THE DECOMPOSITION MECHANISM OF AMMONIUM PERCHLORATE.
Quarterly rept. no. 3, 1 Jan-31 Mar 66,
by James E. Land. 31 Mar 66, 13p. Contract DA-01-021-AMC-12346 (Z) pt. 1,
Unclassified report

See also AD-625 191, -626 805. Continuation of Contract DA-01-009-ORD-1023 (Z).

Descriptors: (*Ammonium compounds, Perchlorates), (*Decomposition, *Perchlorates), Differential thermal analysis, Copper compounds, Lead compounds, Potassium compounds, Cadmium compounds, Zinc compounds, Manganese compounds, Silver compounds, Barium compounds, Magnesium compounds, Sodium compounds, Iron compounds

Data are recorded for the differential thermal analysis (DTA) of samples of mole parts of ammonium perchlorate mixed with mole parts of metal perchlorates in either 95/5 or 99/1 ratio. The runs were made to determine the influence of the additive on the DTA exo- and endotherms recorded for the decomposition of the ammonium perchlorate as it is heated at various rates over a given temperature range. The perchlorates used for doping the ammonium perchlorate were those of copper, lead, potassium, cadmium, zinc, manganese, silver, barium, magnesium, sodium, and iron.

AD-631 794 Fld. 7/2, 7/4
NORTHWESTERN UNIV EVANSTON ILL DEPT OF CHEMISTRY
INFRARED SPECTRA OF THE VAPORS ABOVE SULFURIC AND DEUTERIOSULFURIC ACIDS,
by Scaria M. Chackalackal, and Fred E. Stafford.
2 Sep 65, 5p. Contract DA-31-124-ARO (D)-222,
AROD 4729:2
Unclassified report

Availability: Published in Journal of the American Chemical Society v88 n4 p723-8 Feb 20 1966. Copies to DDC users only.

Descriptors: (*Sulfuric acid, *Spectra (Infrared)), (*Deuterated compounds, Sulfuric acid), Vapors, Molecular structure, Thermochemistry, Absorption spectrum, Sulfur compounds, Oxides, Chromic acids, Chlorine compounds, Chemical bonds

The infrared absorption spectra in the range 4000 to 400/cm of the vapors above liquid H2SO4, 1:1 H2-SO4 D2SO4, and D2SO4 were measured and assigned to the respective gaseous molecules as well as equilibrium concentrations of SO3. SO2 was observed as a decomposition product. Assignment of the frequencies to the normal modes was made using correlations with the related near-tetrahedral molecules X-SO2-Y and with spectra of the condensed phases. Some frequencies are predicted for H2CrO4 and for unassociated gaseous chlorosulfonic acid. (Author)

AD-631 798 Fld. 7/2
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
ULTRAPURE BORON FROM HALIDE INTERMEDIATES.
Physical sciences research papers,
by A. F. Armington, J. T. Buford, and R. J. Starks. Mar 66, 17p. Rept. no. AFCRL-PSRP-207,AFCRL-66-188
Proj. AF-5620, Task 562004,
Unclassified report

Prepared in cooperation with Eagle-Picher Co., Miami, Okla.

Availability: Published in Boron v2 Preparation, Properties, and Applications, p21-33 1965. Copies to DDC users only.

Descriptors: (*Boron, Preparation), Boron compounds, Iodides, Bromides, Purification, Chemical analysis, Distillation, Decomposition, Zone melting, Continuous spectrum, Mass spectrum

The preparation, purification, and analysis of high-purity boron produced from iodide and bromide intermediates are discussed. The discussion begins with the preparation of these intermediates, predominantly from the elements. Of the several methods of purification considered, distillation appears to be the most satisfactory. Decomposition on boron and other substrates was performed using both hydrogen and vacuum procedures. In some cases, the final product was then zone-refined. Analytical results from emission and mass spectroscopy are given. Advantages and disadvantages of the bromide and iodide processes are compared. (Author)

AD-631 257 See Fld. 7/5

AD-631 265 See Fld. 7/4

AD-631 304 See Fld. 7/4

AD-631 374 See Fld. 7/4

AD-631 429 See Fld. 5/1

AD-631 481 See Fld. 7/5

AD-631 511 See Fld. 7/4

AD-631 543 See Fld. 11/6

AD-631 550 See Fld. 7/4

AD-631 677 See Fld. 7/4

AD-631 785 See Fld. 7/5

AD-631 799 See Fld. 7/4

AD-631 812 See Fld. 7/4

7/3. ORGANIC CHEMISTRY

AD-631 217 Fld. 7/3, 11/9, 7/4
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF APPLIED CHEMISTRY
KINETICS OF THE ANIONIC POLYMERIZATION OF STYRENE IN BENZENE. EFFECT OF THE ALKALI-METAL COUNTER-ION,
by J. E. L. Roovers, and S. Bywater. 9 Aug 65, 8p.
NRC 8855
Unclassified report

Availability: Published in Transactions of the Faraday Society n519 v62 pt3 p701-6 Mar 1966. Copies to DDC users only.

Descriptors: (*Styrenes, Polymerization), (*Polymerization, Reaction kinetics), Styrene plastics, Synthesis (Chemistry), Catalysts, Ions, Sodium, Potassium, Rubidium, Cesium, Metalorganic compounds, Chemical equilibrium, Organic solvents, Benzenes, Canada

The propagation reaction in the anionic polymerization of styrene was studied with the counterions, Na, K, Rb and Cs. In the range of active-centre concentration between 0.001 and 0.00001 M, with sodium the ion-pairs are entirely associated, with caesium the ion-pairs are not associated, while potassium shows intermediate behaviour. Absolute ion-pair propagation constants could be measured for polystyryl potassium, rubidium and caesium. The equilibrium constant for association of ion-pairs was determined for polystyryl potassium, together with the heat and entropy of association. (Author)

AD-631 218 Fld. 7/3, 11/9, 7/4
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF APPLIED CHEMISTRY
THE ANIONIC POLYMERIZATION OF ALLYL ACRYLATE AND OF ALLYL METHACRYLATE,
by S. Bywater, P. E. Black, and D. M. Wiles. 29 Oct 65, 9p.
NRC 8825
Unclassified report

Availability: Published in Canadian Journal of Chemistry v44 p695-702 1966. Copies to DDC users only.

Descriptors: (*Fatty acid esters, Polymerization), (*Acrylic resins, Synthesis (Chemistry)), Lithium compounds, Catalysts, Reaction kinetics, Chemical Bonds, Crosslinking (Chemistry), Canada

The low temperature polymerization of allyl acrylate in toluene solution was investigated with n-butyllithium and 1,1-diphenyl-n-hexyllithium initiators. The latter was also used in a study of the polymerization of allyl methacrylate under the same conditions. The reactions between initiator and monomer were rapid in all cases. More than half of the initiator molecules reacted with monomer acrylic double bonds to start polymer chains, only a few of which grew to a high molecular weight, highly isotactic product. Most of the chains remained as a low molecular weight, precipitant-soluble product. The remaining initiator molecules reacted with the carbonyl groups of the monomers to produce species which could be detected as allyl alcohol, after termination of the reaction with acetic acid. The allyl double bonds were not involved in reactions during polymerization but were presumably responsible for the cross-linking which occurred when the polymers were exposed to air. (Author)

AD-631 253 Fld. 7/3, 11/9, 7/4
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF APPLIED CHEMISTRY
POLYMERIZATION MECHANISM OF NONPOLAR MONOMERS BY LITHIUM ALKYLS,
by S. Bywater, and D. J. Worsfold. 11 Feb 65, 11p.
NRC 8661
Unclassified report

Availability: Published in Advances in Chemistry Series n52 p36-45 1966. Copies to DDC users only.

Descriptors: (*Polymerization, Catalysis), (*Lithium compounds, Metalorganic compounds), (*Catalysts, Lithium compounds), Reaction kinetics, Organic solvents, Ions, Furans, Molecular isomerism, Canada

In lithium alkyl-initiated polymerizations only chain initiation and propagation steps need be considered in hydrocarbon solvents. Both reactions are strongly influenced by extensive association of all lithium compounds. The reactive species in chain propagation is the small amount of dissociated material which probably exists as an ion pair. Association phenomena disappear on adding small amounts of polar additives, and the aggregates are replaced by solvated ion pairs. In polar solvents of relatively high dielectric constant (e.g. tetrahydrofuran), some dissociation of the ion pairs to free ions occurs, and both species contribute to the propagation step. The polymerizations are often complicated in tetrahydrofuran by two side reactions, namely carbanion isomerization and reaction with the solvent. (Author)

AD-631 254 Fld. 7/3
PRAIRIE REGIONAL LAB SASKATOON (SASKATCHEWAN)
PERMANGANATE OXIDATION OF OCCIDENTALOL: UNEXPECTED EPOXIDE FORMATION,
by E. von Rudloff. 31 Dec 65, 7p.
NRC 9007
Unclassified report

Availability: Published in Tetrahedron Letters n10 p993-8 1966. Copies to DDC users only.

Descriptors: (*O-heterocyclic compounds, Synthesis (Chemistry)), (*Terpenes, Oxidation), Alcohols, Permanganates, Polycyclic compounds, Spectrum (Infrared), Nuclear magnetic resonance, Dienes, Canada

An attempted degradation of occidentalol with a permanganate-periodate reagent resulted in the formation of an unexpected oxide which various lines of evidence indicate to be the 2,3-epoxy derivative.

AD-631 673 Fld. 7/3
CFSTI Prices: HC $2.00 MF $0.50
STAUFFER CHEMICAL CO WESTON MICH
RESEARCH ON SYNTHESIS AND CHARACTERIZATION OF HIGHLY ARYLATED SILICON ORGANIC COMPOUNDS.
Final rept. 1 Jun 64-15 Jul 65,
by G. M. Hart, G. J. Sterken, R. L. Borton, and S. J. Veselka. Jan 66, 47p. Contract AF 33 (615)-1802, Proj. AF-7023, Task 702301, ARL 66-0005
Unclassified report

Descriptors: (*Silanes, Synthesis (Chemistry)), (*Grignard reactions, Silanes), Stereochemistry, Chemical bonds, Grignard reagents, Bromination, Catalysis, Fluorine compounds, Aromatic compounds, Naphthalenes, Cyclohexanes

Seven sterically hindered tri-aryl-, alkyl-aryl- and tri-alkyl silicon monomers were prepared, six of which contained a single Si-F bond and one of which contained a single Si-H bond. The compounds were prepared according to the following general procedure: (1) RMgX + SiF4 to RSiF3 + MgFX; (2) RMgX + RSiF3 to R2SiF2 + MgFX, (where RMgX = 1-naphthylmagnesium bromide, cyclohexyl-magnesium chloride and benzylmagnesium chloride); (3) ArLi or RMgX + R2SiF2 to ArSi (R2)F or R3SiF, (where ArLi=4-bromophenyllithium and 4 (4'-bromobiphenylyl)-lithium and RMgX is cyclohexylmagnesium chloride). The direct controlled catalytic bromination of benzyltrifluorosilane was successfully carried out in the preparation of the p-bromobenzyl -derivative, as was the reduction of tricyclohexylfluorosilane by diisobutyl aluminum hydride in the preparation of triclohexylsilane. (Author)

AD-631 214 See Fld. 6/1

AD-631 366 See Fld. 7/5

AD-631 374 See Fld. 7/4

AD-631 430 See Fld. 7/4

AD-631 567 See Fld. 11/9

AD-631 595 See Fld. 11/5

AD-631 677 See Fld. 7/4

7/4. PHYSICAL CHEMISTRY

AD-631 256 Fld. 7/4
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF APPLIED CHEMISTRY
[illegible]
by R. F. Purnell. 16 Aug 65, 6p.
[illegible]

Unclassified report

Availability: Published in The Journal of Chemical [illegible]

with the index finger. A fine jet of solution is placed on the plate. Application of the solution is stopped 2-3 cm from the edge of the plate and resumed on the opposite side after the solvent has evaporated from the layer.

AD-631 265 Fld. 7/4, 21/9, 7/2
CFSTI Prices: HC $1.10 MF $0.50
NATIONAL RESEARCH CORP CAMBRIDGE MASS NORTON EXPLORATORY RESEARCH DIV
THERMOCHEMISTRY OF SELECTED COMPOUNDS.
Quarterly letter rept. 15 Nov 65-15 Feb 66,
by Ludwig G. Faucitano. 15 Mar 66, 6p. Contract Nonr-3608 (00)

Unclassified report

See also AD-627 650.

Descriptors: (*Thermochemistry, *Aluminum compounds), (*Borohydrides, Thermochemistry), Water vapor, Hydrolysis, Heat of formation, Hydrolysis, Rocket propellants

Several runs of the H hydrolysis of aluminum borohydride with water vapor were performed. The data obtained was more scattered than desirable (delta H reaction = -227 plus or minus 7 kcal/mole). Indications suggest that the distillation and fractionation temperatures employed in sample preparation may influence the system. This [illegible]

Contract AF 61 (052)-701, Proj. AF-7112, ARL 66-0028

Unclassified report

Descriptors: (*Chemical reactions, *Quantum mechanics), (*Exchange reactions, Quantum mechanics), (*Hydrogen, Exchange reactions), Mathematical models, Nuclear spins, Probability, Potential theory, Wave functions, Integrals, Sweden

The exchange reaction of a hydrogen atom and a hydrogen molecule is studies with a quantum mechanical model for systems under aligning forces. The consideration of the nuclear spins to describe the para-ortho conversion introduces a factor 1/4 in the coordinate dependent cross-sections. An analytical expression is obtained for the total cross-section sigma by using a piece-wise interaction potential and computational simplifications. Calculations of sigma as a function of the initial relative wavenumber k, for k = or approx. = 7 (a.u. show a threshold for sigma followed by an oscillatory behaviour around a mean sigma av = 0.56 a.u. This function is shifted to larger k when increasing the potential strength and the initial molecular angular momentum, but only slightly in the last case. Sigma is noticeably changed when varying the range of the chemical interaction and the hard-core radius of the H3 potential. The mean value sigma av increases when the hard-core radius grows, but seems fairly independent of the other [illegible]. (Author)

Contents (titles of papers): Double-layer studies; Discreteness-of-charge micropotentials, III, dielectric -conductive imaging; Adsorption of aromatic sulphonates at a mercury electrode, Part 2, sodium p-toluenesulphonate - an example of two position adsorption; Structure of the mercury-solution electrical double layer in the presence of adsorbed oxyanions; Some aspects of the thermodynamics of the platinum hydrogen electrode; Ion-pairing mechanisms in electrode processes; Periodic variation of exchange current density of hydrogen electrode reaction with atomic number and reaction mechanism; Pressure-coefficient of the hydrogen electrode reaction; Some problems in electrodeposition; Ellipsometric determination of the mechanism of passivity of nickel; Oxide involvement in some anodic oxidation reactions; Electrochemistry of surface oxides; Charge transfer processes at organic insulator electrodes; Electrochemical behaviour of semiconductors under illumination; and Photo-currents produced by ultra-violet irradiation of mercury electrodes.

[illegible]

[illegible]
UPPSALA UNIV (SWEDEN). QUANTUM CHEMISTRY GROUP
[illegible]
by David A. Micha. 1 Aug 65. 24p. Rept. no. [illegible]
[illegible]

ic compounds, Ketones, N-heterocyclic compounds, Pyrolysis, Carbon dioxide, Lactones, Halides

The D.T.A. technique was used to obtain the fusion curves of NaBr, NaCl, and NaF to pressures of 12, 43 and 45 kilobars respectively. The constants c and A of the Simon melting equations were computed from the experimental results. At 16 Kb. and a temperature range of 175-225C phenyl isocyanate was converted to its cyclic dimer (1,3-diphenyl-2,4-uretidinedione) in greater than 90% yield. The dimerization reaction was favored by pressure. At higher pressures the temperature range was extended. Both the cyclic trimer (triphenyl isocyanurate) and another dimer of phenyl isocyanate (3-phenyl -2,4-dioxo-tetrahydroquinazoline) were the principal products formed at 16 Kb. and temperatures equal to or greater than 275C. At these higher temperatures CO2 was the sole gaseous product. This gas may arise by pyrolysis of yet another phenyl isocyanate dimer having a four membered ring lactone structure. At 8 Kb. and 250C the major product of the reaction is thought to be a 2:1 cyclic trimer of phenyl isocyanate and diphenylcarbodiimide. (Author)

[illegible]
UPPSALA UNIV (SWEDEN). QUANTUM CHEMISTRY GROUP
[illegible]
by Yngve Ohrn, and Jan Linderberg. 22 Mar 65. 10p. Rept. no. Sep. [illegible]
[illegible]

HIGH PRESSURES,
by E. Whalley. 1966. 3p.
NRC 8851

Unclassified report

Availability: Published in Chemistry in Canada Jan 1966. Copies to DDC users only.

Descriptors: (*Physical chemistry, High-pressure research), (*High-pressure research, Canada), Kinetic energy, Kinetic theory, Chemical reactions, Equations of state, Liquids, Gases, X-ray diffraction analysis, Dielectric properties, Thermoelectricity, Alloys, Copper alloy, Spectroscopy

The activities of the High Pressure Section, Division of Applied Chemistry of the National Research Council of Canada, in the following fields of physical chemistry are described: chemical kinetics, chemical reactions, equation of state of liquids and gases, spectroscopy of high-pressure phases, X-ray diffraction, dielectric properties, and thermoelectric power of alloys.

[illegible]
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO). DIV OF RADIO AND ELECTRICAL ENGINEERING
[illegible]
by J. P. Hobson. 1966. 3p
[illegible]

A REDETERMINATION OF THE INTEGRATED INTENSITY OF THE 15 MICRON BANDS OF CARBON DIOXIDE,
by P. Varanasi, and J. L. Lauer. 30 Jul 65, 4p.
Contract Nonr-2216 (00), Proj. NR-015 401,
Unclassified report

Availability: Published in J. Quant. Spectrosc. Radiat. Transfer. v6 p127-30 1966. Copies to DDC users only.

Descriptors: (*Carbon dioxide, Band spectrum), (*Band spectrum, Intensity), (*Infrared spectroscopy, Carbon dioxide), Pressure, Measurement

The integrated intensity of the 15 micron bands of carbon dioxide at room temperature was determined by the self-broadening technique using gas pressures up to 10 atm. Great care was taken to eliminate stray light and to measure the geometric cell length at every pressure. A value of 200 plus or minus 10/sq cm/atm was obtained. (Author)

AD-631 222 Fld. 7/2
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF APPLIED CHEMISTRY
DIRECT DETERMINATION OF SMALL QUANTITIES OF RARE EARTH AND YTTRIUM OXIDES IN THORIA BY EMISSION SPECTROSCOPY,
Revised ed.,
by A. Mykytiuk, D. S. Russell, and S. S. Berman. 22 Apr 65, 11p.
NRC 8817
Unclassified report

Revision of Manuscript submitted 2 Nov 1964.

Availability: Published in Talanta v13 p175-84 1966. Copies to DDC users only.

Descriptors: (*Thorium compounds, Oxides), (*Rare earth compounds, Oxides), (*Yttrium compounds, Oxides), Chemical analysis, Spectroscopy, Emissivity, Neodymium compounds, Samarium compounds, Cerium compounds, Lanthanum compounds, Praesodymium compounds, Silver compounds, Chlorides, Distillation, Canada

Methods are proposed for the determination of submicrogram quantities of rare earth and yttrium oxides in thorium oxide by emission spectroscopy, without previous separation or concentration of these oxides in the sample. It is possible to volatilise these refractory materials from the thoria using silver chloride as the carrier. The carrier distillation technique in conjunction with relatively high dispersion spectroscopy (0.8-1.1A/mm) makes possible analyses at levels which were previously only feasible by preconcentration methods (e.g., La2O3 and Y2O3, 5 ppm; Nd2O3 and Sm2O3, 10 ppm; CeO2 and Pr6O11, 20 ppm in a 10-mg sample of ThO2).

AD-631 282 Fld. 7/2
CFSTI Prices: HC $1.00 MF $0.50
COLORADO UNIV BOULDER
HALOGENOID COMPLEXES.
Final technical rept.,
by Raymond N. Keller. Apr 66, 10p. Contract DA-ARO (D)-31-124-G198, Proj. 3292-C, AROD 3292:5
Unclassified report

Descriptors: (*Complex compounds, Chemical properties), (*Inorganic acids, Dissociation), Azides, Selenium compounds, Cyanides, Carbonates, Cyanates, Reaction kinetics, Cobalt compounds, Mercury compounds, Platinum compounds

A summary is given of work involving the chemistry of the following halogenoid or pseudo-halide ions: azide (N3 (-)), selenocyanate (SeCN (-)), azidodithiocarbonate (SCSN3 (-)), and cyanate (NCO (-)). The emphasis of the research was to determine to what extent the pseudo-halide ions could act as ligands in coordination complexes and the general nature of the resulting compounds. Dissociation constants were obtained for the acids HCN, HN3, HOCN, HSCN, and HSeCN. (Author)

AD-631 283 Fld. 7/2, 20/13
CFSTI Prices: HC $1.00 MF $0.50
CALIFORNIA UNIV DAVIS
HEAT TRANSFER IN POROUS MEDIA.
Final rept.,
by J. M. Smith. 5 Apr 66, 4p. Contract DA-ARO (D)-31-124-G191, Proj. 3235-E AROD 3235:13
Unclassified report

Descriptors: (*Catalysts, Heat transfer), (*Porous materials, Heat transfer), Diffusivity, Diffusion, Thermal diffusion, Thermal conductivity, Pellets

The purpose of the investigation was to study the thermal and diffusion characteristics of porous solid materials used as catalysts or catalyst carriers. It is now possible to estimate reasonably well the diffusivity in a porous catalyst using a random pore model. The method is summarized in a publication resulting from work on this project entitled 'Diffusion in Catalyst Pellets' published in Chemical Engineering Science Vol. 17, Page 825 (1962). A paper presenting the experimental measurements of thermal conductivity was published in The Journal of Chemical Engineering Data, Vol. 8, Page 54 (1963).

AD-631 343 Fld. 7/2, 7/4
CFSTI Prices: HC $3.00 MF $0.75
BOSTON COLL CHESTNUT HILL MASS
A COMPARATIVE STUDY OF THE SPECTROCHEMICAL ANALYSIS OF A COPPER BASE SOLUTION BY THE INTENSITY LINE RATIO, THE LINE WIDTH AND THE AREA RATIO METHODS.
Final rept., pt. 2, 1 Oct 64-1 Apr 65,
by James J. Devlin, and James F. Waterbury. 23 Aug 65, 66p. Contract AF 19 (604)-8819, Proj. AF-5620, Task 562003,
AFCRL 65-855-Pt-2
Unclassified report

Descriptors: (*Copper, Spectroscopy), (*Line spectrum, Copper), Solutions, Impurities, Lead, Zinc, Tin, Concentration (Chemistry)

The precision of spectrochemical analysis declines in proportion to the increase in concentration of impurities for which an analysis is sought. This study endeavored to discover of it was possible to increase the precision for a copper base metal for higher percentages of lead, zinc and tin. A solution technique was followed since this at once offered the most reliable approach to preparing standards and because segregation opposes a reproducible result. Three methods of reducing the data of a large number of line pairs were followed, namely, the Intensity Ratio, the Line Width and the Integrated Area Ratio methods. The accummulated data shows little advantage to using the Line Width and the Integrated Ratio Methods over the Line Intensity Ratio Method when lower concentrations are investigated. As the concentrations increase however, a marked decrease in the coefficient of variation results from using the Integrated Ratio Method. This increased precision is accompanied by additional time and effort in preparing working curves. After a curve is established, on the other hand, the method consumes a little more time than presently used methods. (Author)

AD-631 398 Fld. 7/2
CFSTI Prices: HC $2.60 MF $0.50
TULANE UNIV NEW ORLEANS LA
PHYSICAL AND PREPARATIVE STUDIES OF MOLYBDENUM AND TUNGSTEN COMPLEXES.
Scientific interim rept., Dec 64-Nov 65,
by Ronald D. Archer. Jan 66, 27p. Contract AF 33 (615)-1043, Proj. AF-7023, Task 702302, ARL 66-0015
Unclassified report

Descriptors: (*Molybdenum compounds, Complex compounds), (*Tungsten compounds, Complex compounds), (*Complex compounds, Synthesis (Chemistry)), Quinolines, Chelate compounds, Pyridines, Oxides, Organic sulfur compounds, Ethylenediamine, Photochemistry, O-heterocyclic compounds, Iron compounds, Potassium compounds, Molecular isomerism, Spectroscopy

Several new molybdenum complexes containing chelated 8-hydroxy-quinolinato ligands, including (MoCl (C5H5N) (C9H6NO)2) and (MoCl2 (C5H5N)2 (C9H6NO) and three oxomolybdenum (V) derivatives were prepared and studied. A cationic molybdenum (III) species containing chelated ethylenediamine and a cationic tungsten (IV) species containing chelated 2,2 (1)-bipyridine were also synthesized. Other preparative studies included photochemical investigations with tungsten (IV). The complex formerly designated as K2MoCl5H2O by other workers was shown to have less than enough potassium for such a formula, the spectra of K3MoCl6 as currently in the literature has been shown to be incorrect, and the apparent discrepancy in the literature concerning the tetrazole complex Fe (C2F3N4)2.2H2O was explained. (Author)

AD-631 593 Fld. 7/2, 7/4
CFSTI Prices: HC $1.60 MF $0.50
AUBURN UNIV ALA
A STUDY OF THE DECOMPOSITION MECHANISM OF AMMONIUM PERCHLORATE.
Quarterly rept. no. 3, 1 Jan-31 Mar 66,
by James E. Land. 31 Mar 66, 13p. Contract DA-01-021-AMC-12346 (Z) pt. 1,
Unclassified report

See also AD-625 191, -626 805. Continuation of Contract DA-01-009-ORD-1023 (Z).

Descriptors: (*Ammonium compounds, Perchlorates), (*Decomposition, *Perchlorates), Differential thermal analysis, Copper compounds, Lead compounds, Potassium compounds, Cadmium compounds, Zinc compounds, Manganese compounds, Silver compounds, Barium compounds, Magnesium compounds, Sodium compounds, Iron compounds

Data are recorded for the differential thermal analysis (DTA) of samples of mole parts of ammonium perchlorate mixed with mole parts of metal perchlorates in either 95/5 or 99/1 ratio. The runs were made to determine the influence of the additive on the DTA exo- and endotherms recorded for the decomposition of the ammonium perchlorate as it is heated at various rates over a given temperature range. The perchlorates used for doping the ammonium perchlorate were those of copper, lead, potassium, cadmium, zinc, manganese, silver, barium, magnesium, sodium, and iron.

AD-631 794 Fld. 7/2, 7/4
NORTHWESTERN UNIV EVANSTON ILL DEPT OF CHEMISTRY
INFRARED SPECTRA OF THE VAPORS ABOVE SULFURIC AND DEUTERIOSULFURIC ACIDS,
by Scaria M. Chackalackal, and Fred E. Stafford. 2 Sep 65, 5p. Contract DA-31-124-ARO (D)-222,
AROD 4729:2
Unclassified report

Availability: Published in Journal of the American Chemical Society v88 n4 p723-8 Feb 20 1966. Copies to DDC users only.

Descriptors: (*Sulfuric acid, *Spectra (Infrared)), (*Deuterated compounds, Sulfuric acid), Vapors, Molecular structure, Thermochemistry, Absorption spectrum, Sulfur compounds, Oxides, Chromic acids, Chlorine compounds, Chemical bonds

The infrared absorption spectra in the range 4000 to 400/cm of the vapors above liquid H2SO4, 1:1 H2-SO4 D2SO4, and D2SO4 were measured and assigned to the respective gaseous molecules as well as equilibrium concentrations of SO3. SO2 was observed as a decomposition product. Assignment of the frequencies to the normal modes was made using correlations with the related near-tetrahedral molecules X-SO2-Y and with spectra of the condensed phases. Some frequencies are predicted for H2CrO4 and for unassociated gaseous chlorosulfonic acid. (Author)

AD-631 798 Fld. 7/2
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
ULTRAPURE BORON FROM HALIDE INTERMEDIATES.
Physical sciences research papers,
by A. F. Armington, J. T. Buford, and R. J. Starks. Mar 66, 17p. Rept. no. AFCRL-PSRP-207,AFCRL-66-188
Proj. AF-5620, Task 562004,
Unclassified report

Prepared in cooperation with Eagle-Picher Co., Miami, Okla.

Availability: Published in Boron v2 Preparation, Properties, and Applications, p21-33 1965. Copies to DDC users only.

Descriptors: (*Boron, Preparation), Boron compounds, Iodides, Bromides, Purification, Chemical analysis, Distillation, Decomposition, Zone melting, Continuous spectrum, Mass spectrum

The preparation, purification, and analysis of high-purity boron produced from iodide and bromide intermediates are discussed. The discussion begins with the preparation of these intermediates, predominantly from the elements. Of the several methods of purification considered, distillation appears to be the most satisfactory. Decomposition on boron and other substrates was performed using both hydrogen and vacuum procedures. In some cases, the final product was then zone-refined. Analytical results from emission and mass spectroscopy are given. Advantages and disadvantages of the bromide and iodide processes are compared. (Author)

AD-631 257 See Fld. 7/5

AD-631 265 See Fld. 7/4

AD-631 304 See Fld. 7/4

AD-631 374 See Fld. 7/4

AD-631 429 See Fld. 5/1

AD-631 481 See Fld. 7/5

AD-631 511 See Fld. 7/4

AD-631 543 See Fld. 11/6

AD-631 550 See Fld. 7/4

AD-631 677 See Fld. 7/4

AD-631 785 See Fld. 7/5

AD-631 799 See Fld. 7/4

AD-631 812 See Fld. 7/4

7/3. ORGANIC CHEMISTRY

AD-631 217 Fld. 7/3, 11/9, 7/4
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF APPLIED CHEMISTRY
KINETICS OF THE ANIONIC POLYMERIZATION OF STYRENE IN BENZENE. EFFECT OF THE ALKALI-METAL COUNTER-ION,
by J. E. L. Roovers, and S. Bywater. 9 Aug 65, 8p.
NRC 8855
Unclassified report

Availability: Published in Transactions of the Faraday Society n519 v62 pt3 p701-6 Mar 1966. Copies to DDC users only.

Descriptors: (*Styrenes, Polymerization), (*Polymerization, Reaction kinetics), Styrene plastics, Synthesis (Chemistry), Catalysts, Ions, Sodium, Potassium, Rubidium, Cesium, Metalorganic compounds, Chemical equilibrium, Organic solvents, Benzenes, Canada

The propagation reaction in the anionic polymerization of styrene was studied with the counter-ions, Na, K, Rb and Cs. In the range of active-centre concentration between 0.001 and 0.00001 M, with sodium the ion-pairs are entirely associated, with caesium the ion-pairs are not associated, while potassium shows intermediate behaviour. Absolute ion-pair propagation constants could be measured for polystyryl potassium, rubidium and caesium. The equilibrium constant for association of ion-pairs was determined for polystyryl potassium, together with the heat and entropy of association. (Author)

AD-631 218 Fld. 7/3, 11/9, 7/4
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF APPLIED CHEMISTRY
THE ANIONIC POLYMERIZATION OF ALLYL ACRYLATE AND OF ALLYL METHACRYLATE,
by S. Bywater, P. E. Black, and D. M. Wiles. 29 Oct 65, 9p.
NRC 8825
Unclassified report

Availability: Published in Canadian Journal of Chemistry v44 p695-702 1966. Copies to DDC users only.

Descriptors: (*Fatty acid esters, Polymerization), (*Acrylic resins, Synthesis (Chemistry)), Lithium compounds, Catalysts, Reaction kinetics, Chemical Bonds, Crosslinking (Chemistry), Canada

The low temperature polymerization of allyl acrylate in toluene solution was investigated with n-butyllithium and 1,1-diphenyl-n-hexyllithium initiators. The latter was also used in a study of the polymerization of allyl methacrylate under the same conditions. The reactions between initiator and monomer were rapid in all cases. More than half of the initiator molecules reacted with monomer acrylic double bonds to start polymer chains, only a few of which grew to a high molecular weight, highly isotactic product. Most of the chains remained as a low molecular weight, precipitant-soluble product. The remaining initiator molecules reacted with the carbonyl groups of the monomers to produce species which could be detected as allyl alcohol, after termination of the reaction with acetic acid. The allyl double bonds were not involved in reactions during polymerization 'but were presumably responsible for the cross-linking which occurred when the polymers were exposed to air. (Author)

AD-631 253 Fld. 7/3, 11/9, 7/4
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF APPLIED CHEMISTRY
POLYMERIZATION MECHANISM OF NONPOLAR MONOMERS BY LITHIUM ALKYLS,
by S. Bywater, and D. J. Worsfold. 11 Feb 65, 11p.
NRC 8661
Unclassified report

Availability: Published in Advances in Chemistry Series n52 p36-45 1966. Copies to DDC users only.

Descriptors: (*Polymerization, Catalysis), (*Lithium compounds, Metalorganic compounds), (*Catalysts, Lithium compounds), Reaction kinetics, Organic solvents, Ions, Furans, Molecular isomerism, Canada

In lithium alkyl-initiated polymerizations only chain initiation and propagation steps need be considered in hydrocarbon solvents. Both reactions are strongly influenced by extensive association of all lithium compounds. The reactive species in chain propagation is the small amount of dissociated material which probably exists as an ion pair. Association phenomena disappear on adding small amounts of polar additives, and the aggregates are replaced by solvated ion pairs. In polar solvents of relatively high dielectric constant (e.g. tetrahydrofuran), some dissociation of the ion pairs to free ions occurs, and both species contribute to the propagation step. The polymerizations are often complicated in tetrahydrofuran by two side reactions, namely carbanion isomerization and reaction with the solvent. (Author)

AD-631 254 Fld. 7/3
PRAIRIE REGIONAL LAB SASKATOON (SASKATCHEWAN)
PERMANGANATE OXIDATION OF OCCIDENTALOL: UNEXPECTED EPOXIDE FORMATION,
by E. von Rudloff. 31 Dec 65, 7p.
NRC 9007
Unclassified report

Availability: Published in Tetrahedron Letters n10 p993-8 1966. Copies to DDC users only.

Descriptors: (*O-heterocyclic compounds, Synthesis (Chemistry)), (*Terpenes, Oxidation), Alcohols, Permanganates, Polycyclic compounds, Spectrum (Infrared), Nuclear magnetic resonance, Dienes, Canada

An attempted degradation of occidentalol with a permanganate-periodate reagent resulted in the formation of an unexpected oxide which various lines of evidence indicate to be the 2,3-epoxy derivative.

AD-631 673 Fld. 7/3
CFSTI Prices: HC $2.00 MF $0.50
STAUFFER CHEMICAL CO WESTON MICH
RESEARCH ON SYNTHESIS AND CHARACTERIZATION OF HIGHLY ARYLATED SILICON ORGANIC COMPOUNDS.
Final rept. 1 Jun 64-15 Jul 65,
by G. M. Hart, G. J. Sterken, R. L. Borton, and S. J.Veselka. Jan 66, 47p. Contract AF 33 (615)-1802, Proj. AF-7023, Task 702301, ARL 66-0005
Unclassified report

Descriptors: (*Silanes, Synthesis (Chemistry)), (*Grignard reactions, Silanes), Stereochemistry, Chemical bonds, Grignard reagents, Bromination, Catalysis, Fluorine compounds, Aromatic compounds, Naphthalenes, Cyclohexanes

Seven sterically hindered tri-aryl-, alkyl-aryl- and tri-alkyl silicon monomers were prepared, six of which contained a single Si-F bond and one of which contained a single Si-H bond. The compounds were prepared according to the following general procedure: (1) RMgX + SiF4 to RSiF3 + MgFX; (2) RMgX + RSiF3 to R2SiF2 + MgFX, (where RMgX = 1-naphthylmagnesium bromide, cyclohexyl-magnesium chloride and benzylmagnesium chloride); (3) ArLi or RMgX + R2SiF2 to ArSi (R2)F or R3SiF, (where ArLi=4-bromophenyllithium and 4 (4'-bromobiphenylyl)-lithium and RMgX is cyclohexylmagnesium chloride). The direct controlled catalytic bromination of benzyltrifluorosilane was successfully carried out in the preparation of the p-bromobenzyl-derivative, as was the reduction of tricyclohexylfluorosilane by diisobutyl aluminum hydride in the preparation of triclohexylsilane. (Author)

AD-631 214 See Fld. 6/1

AD-631 366 See Fld. 7/5

AD-631 374 See Fld. 7/4

AD-631 430 See Fld. 7/4

AD-631 567 See Fld. 11/9

AD-631 595 See Fld. 11/5

AD-631 677 See Fld. 7/4

7/4. PHYSICAL CHEMISTRY

AD-631 256 Fld. 7/4
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF APPLIED CHEMISTRY
CROSS SECTIONS FOR IONIZATION BY ELECTRONS. I. ABSOLUTE IONIZATION CROSS SECTIONS OF ZN, CD, AND TE2. II. COMPARISON OF THEORETICAL WITH EXPERIMENTAL VALUES FOR ATOMS AND MOLECULES,
by R. F. Pottie. 26 Aug 65, 8p.
NRC 8827

Unclassified report

Availability: Published in The Journal of Chemical Physics v44 n3 p916-22 Feb 1 1966. Copies to DDC users only.

Descriptors: (*Ionization, Probability), (*Zinc, Ionization), (*Cadmium, Ionization), (*Tellurium, Ionization), Electron bombardment, Ionic current, Ion sources, Theory, Canada

Ionization cross sections for Zn, Cd, and Te2 vapors were measured by collection of the total positive ion currents produced from electron impact by 50-eV electrons in the specially designed ion source of a mass spectrometer. The results are combined with available data to set up a compilation of absolute ionization cross sections for 27 atoms. Very limited agreement is found with theoretical ionization cross sections: It is shown that ionization cross sections of molecules cannot be calculated reliably by summation of the ionization cross sections of the constituent atoms. (Author)

AD-631 262 Fld. 7/4
ATLANTIC REGIONAL LAB HALIFAX (NOVA SCOTIA)
A METHOD FOR SAMPLE APPLICATION IN PREPARATIVE THIN-LAYER CHROMATOGRAPHY,
by G. P. Arsenault. 12 Jul 65, 3p.
NRC 8709

Unclassified report

Availability: Published in Journal of Chromatography v21 p155-6 1966. Copies to DDCusers only.

Descriptors: (*Thin layer chromatography, Test methods), Canada

Successful preparative thin-layer chromatography (TLC) requires uniform application of the sample as a band of narrow width at the starting line. A simple method for rapid and controlled application to one plate of more than 1 ml of solution without damaging the layer is described below. The key component used is a needle guide. The needle is connected to a 2 to 5 ml syringe with Luer-Lok tip and inserted in a slot (6.5 mm wide X 200 mm long) milled in a spotting plastic template. The syringe is filled and placed in position with the arms of the needle guide resting on the template 2-3 cm from one edge of the plate. The syringe is slanted at 45 degrees from vertical, in the direction of application, and moved at an even rate across the plate while even pressure is exerted on the plunger with the index finger. A fine jet of solution is placed on the plate. Application of the solution is stopped 2-3 cm from the edge of the plate and resumed on the opposite side after the solvent has evaporated from the layer.

AD-631 265 Fld. 7/4, 21/9, 7/2
CFSTI Prices: HC $1.10 MF $0.50
NATIONAL RESEARCH CORP CAMBRIDGE MASS NORTON EXPLORATORY RESEARCH DIV
THERMOCHEMISTRY OF SELECTED COMPOUNDS.
Quarterly letter rept. 15 Nov 65-15 Feb 66,
by Ludwig G. Fasolino. 15 Mar 66, 6p. Contract Nonr-3608 (00)

Unclassified report

See also AD-627 656.

Descriptors: (*Thermochemistry, *Aluminum compounds), (*Borohydrides, Thermochemistry), Water vapor, Hydrolysis, Heat of formation, Hydrolysis, Rocket propellants

Several runs of the 2C hydrolysis of aluminum borohydride with water vapor were performed. The data obtained was more scattered than desirable (delta H reaction = -227 plus or minus 7 kcal/mole). Indications suggest that the distillation and fractionation temperatures employed in sample preparation may influence this scatter. This is being studied as a variable. This heat data would yield a value of -28 kcal/mole for the heat of formation of aluminum borohydride. (Author)

AD-631 290 Fld. 7/4, 20/10
CFSTI Prices: HC $2.00 MF $0.50
UPPSALA UNIV (SWEDEN) QUANTUM CHEMISTRY GROUP
A QUANTUM MECHANICAL MODEL FOR SIMPLE MOLECULAR REACTIONS.
Scientific rept.,
by David A. Micha. 15 Jul 65, 48p. Rept. no. Scientific-49,
Contract AF 61 (052)-701, Proj. AF-7112, ARL 66-0026

Unclassified report

Descriptors: (*Chemical reactions, *Quantum mechanics), (*Exchange reactions, Quantum mechanics), Integral equations, Differential equations, Potential theory, Approximation (Mathematics), Wave functions, Green's function, Probability, Mathematical models, Scattering, Sweden

The exchange reaction A+BC to AB+C for a system of three atoms interacting under an aligning potential is studied using the integro-differential method for complex collisions. A two-state approximation leads to a pair of coupled equations which is solved by using a distorted wave for the initial channel relative motion and by introducing the Green function for the final channel relative motion. Total and differential reaction cross-sections are evaluated from the asymptotic form of the wavefunctions. The invariance of the system under time-reversal is used to relate the direct and reverse reactions. The model gives the dependence of the relative motion potential on the molecular quantum numbers, shows that the alignment introduces a centrifugal potential, that the initial and final molecular angular momenta must be equal and that a threshold energy exists, depending on the initial and final molecular states. It suggests the way of finding lower bounds to the threshold energies. The advantages and approximations for the model are discussed and possible generalizations pointed out. (Author)

AD-631 291 Fld. 7/4, 20/10
CFSTI Prices: HC $2.00 MF $0.50
UPPSALA UNIV (SWEDEN) QUANTUM CHEMISTRY GROUP
THE EXCHANGE REACTION OF H AND H2.
Scientific rept.,
by David A. Micha. 15 Jul 65, 28p. Rept. no. Scientific-50,
Contract AF 61 (052)-701, Proj. AF-7112, ARL 66-0028

Unclassified report

Descriptors: (*Chemical reactions, *Quantum mechanics), (*Exchange reactions, Quantum mechanics), (*Hydrogen, Exchange reactions), Mathematical models, Nuclear spins, Probability, Potential theory, Wave functions, Integrals, Sweden

The exchange reaction of a hydrogen atom and a hydrogen molecule is studies with a quantum mechanical model for systems under aligning forces. The consideration of the nuclear spins to describe the para-ortho conversion introduces a factor 3/4 in the coordinate dependent cross-sections. An analytical expression is obtained for the total cross-section sigma by using a piece-wise interaction potential and computational simplifications. Calculations of sigma as a function of the initial relative wavenumber k, for k < or approx. = 7.00 a.u. show a threshold for sigma followed by an oscillatory behaviour around a mean sigma-av = 0.50 a.u. This function is shifted to larger k when increasing the potential strength and the initial molecular angular momentum, but only slightly in this last case. Sigma is noticeably changed when varying the range of the chemical interaction and the hard-core radius of the H3 potential. The mean value sigma-av increases when the hard-core radius grows, but seems fairly independent of the other parameters. (Author)

AD-631 304 Fld. 7/4, 7/2
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF APPLIED CHEMISTRY
ELECTRON SPIN RESONANCE SPECTRUM OF NH2+S03-,
by N. M. Atherton, and J. R. Morton. 1966, 4p.
NRC 8850

Unclassified report

Availability: Published in Nature v209 n5020 p294-5 Jan 15 1966. Copies to DDC users only.

Descriptors: (*Electron spin resonance, *Free radicals), Sulfamic acids, Sulfites, Amines, Hyperfine structure, Protons, Nitrogen, Radioactive isotopes, Stereochemistry, Canada, Atomic spectroscopy

If the present estimate of 85 plus or minus 10 Mc/s for the isotropic interaction at 4 K be accepted, a significant increase over that pertaining at 300 K (65 Mc/s) is apparent, and this may be due to a distortion of about 5 degrees from a planar skeleton at the nitrogen atom. An increase of comparable magnitude may well be due to the crystal field effects discussed by Rowlands and Whiffen (Nature, 193:61 (1962)).

AD-631 316 Fld. 7/4, 9/1, 20/3, 20/12
CFSTI Prices: HC $7.85 MF $2.25
ELECTROCHEMICAL SOCIETY INC NEW YORK
SYMPOSIUM ON ELECTRODE PROCESSES OF THE THEORETICAL DIVISION.
6 May 66, 485p. Contract AF 49 (638)-1647, AFOSR 66-0638

Unclassified report

Prepared for presentation at The Electrochemical Society, Inc. Spring Meeting, Cleveland, Ohio, May 1-6, 1966.

Descriptors: (*Electrochemistry, Symposia), (*Electrolytic cells, Symposia), Electrical double layer, Dielectrics, Ions, Electrical conductance, Sulfonates, Mercury, Electrodes, Adsorption, Toluenes, Thermodynamics, Platinum, Hydrogen, Electrodeposition, Nickel, Oxides, Oxidation-reduction reactions, Anodes (Electrolytic cell), Organic compounds, Semiconductors, Ultraviolet radiation, Atomic properties, Surface properties, Electric insulation

Contents (titles of papers): Double-layer studies; Discreteness-of-charge micropotentials, III, dielectric -conductive imaging; Adsorption of aromatic sulphonates at a mercury electrode, Part 2, sodium p-toluenesulphonate - an example of two position adsorption; Structure of the mercury-solution electrical double layer in the presence of adsorbed oxyanions; Some aspects of the thermodynamics of the platinum hydrogen electrode; Ion-pairing mechanisms in electrode processes; Periodic variation of exchange current density of hydrogen electrode reaction with atomic number and reaction mechanism; Pressure-coefficient of the hydrogen electrode reaction; Some problems in electrodeposition; Ellipsometric determination of the mechanism of passivity of nickel; Oxide involvement in some anodic oxidation reactions; Electrochemistry of surface oxides; Charge transfer processes at organic insulator electrodes; Electrochemical behaviour of semiconductors under illumination; and Photo-currents produced by ultra-violet irradiation of mercury electrodes.

AD-631 323 Fld. 7/4
CFSTI Prices: HC $2.60 MF $0.50
UPPSALA UNIV (SWEDEN) QUANTUM CHEMISTRY GROUP
ANGULAR DISTRIBUTION OF PRODUCTS OF HYDROGEN ATOM-HYDROGEN MOLECULE REACTIONS,
by David A. Micha. 1 Aug 65, 24p. Rept. no. Scientific-51,
Contract AF 61 (052)-701,
ARL 66-0025

Unclassified report

Descriptors: (*Chemical reactions, *Quantum mechanics), (*Hydrogen, Exchange reactions), (*Exchange reactions, Quantum mechanics), Deuterium, Deuterated compounds, Mathematical models, Scattering, Kinetic energy, Probability, Molecular energy levels, Molecular beams, Sweden

A previously developed theoretical model is used to describe the reactions D + H2 = DH + H and H + D2 = HD + D. Analytical expressions for the cross-sections are given and the permutational symmetry problem is briefly discussed. The results show a threshold region of relative kinetic energies, for which the reactions lead most probably to backward scattering in the center of mass system, the partial cross-sections with small relative angular momenta being dominant. At larger energies forward scattering is the most probable and the partial cross-sections with the highest relative angular momenta dominate. Comparison with experiments indicate agreement with the measured scattering directions, with the speed of HD product molecules and with the absolute value of differential cross-sections. The calculations predict an undetected forward scattering peak in the case of H + D2, and show that the HD molecules from these reactions are mostly in low excited rotational states. (Author)

AD-631 374 Fld. 7/4, 7/2, 7/3
CFSTI Prices: HC $5.60 MF $0.50
ALLIED CHEMICAL CORP MORRISTOWN N J CENTRAL RESEARCH LAB
THE EFFECT OF PRESSURE ON THE MELTING POINT OF SODIUM HALIDES. REACTIONS OF PHENYL ISOCYANATE AT HIGH PRESSURES.
Final rept. on high pressure basic research programs, 1 Apr 64-31 Mar 65,
by L. F. Nienart, J. L. Bach, W. M. Beyleveld, and C. Woolf. Mar 65, 53p. Contract DA-31-124-ARO (D)-201, Proj. DA-20014501B13A
AROD 4993:1

Unclassified report

Descriptors: (*Sodium compounds, Melting point), (*Salts, Melting point), (*Nitriles, Chemical reactions), (*High-pressure research, Chemistry), Bromides, Chlorides, Fluorides, Differential thermal analysis, Aromatic compounds, Ketones, N-heterocyclic compounds, Pyrolysis, Carbon dioxide, Lactones, Halides

The D.T.A. technique was used to obtain the fusion curves of NaBr, NaCl, and NaF to pressures of 12, 43 and 45 kilobars respectively. The constants c and A of the Simon melting equations were computed from the experimental results. At 16 Kb. and a temperature range of 175-225C phenyl isocyanate was converted to its cyclic dimer (1,3-diphenyl-2,4-uretidinedione) in greater than 90% yield. The dimerization reaction was favored by pressure. At higher pressures the temperature range was extended. Both the cyclic trimer (triphenyl isocyanurate) and another dimer of phenyl isocyanate (3-phenyl -2,4-dioxo-tetrahydroquinazoline) were the principal products formed at 16 Kb. and temperatures equal to or greater than 275C. At these higher temperatures CO2 was the sole gaseous product. This gas may arise by pyrolysis of yet another phenyl isocyanate dimer having a four membered ring lactone structure. At 8 Kb. and 250C the major product of the reaction is thought to be a 2:1 cyclic trimer of phenyl isocyanate and diphenylcarbodiimide. (Author)

AD-631 430 Fld. 7/4, 20/10, 7/3
UPPSALA UNIV (SWEDEN) QUANTUM CHEMISTRY GROUP
PROPAGATORS FOR ALTERNANT HYDROCARBON MOLECULES,
by Yngve Ohrn, and Jan Linderberg. 22 Mar 65, 10p. Rept. no. Scientific-46,
Contract AF 61 (052)-701, Proj. AF-7112,
ARL 66-0027

Unclassified report

Availability: Published in The Physical Review v139 n4A pA1063-8 Aug 16 1965. Copies to DDC users only.

Descriptors: (*Hydrocarbons, Excitation), (*Green's function, Hydrocarbons), (*Molecular energy levels, Green's function), Carriers (Semiconductors), Propagation, Ethylenes, Benzene, Naphthalenes, Anthracenes, Quantum statistics, Absorption spectrum, Wave functions, Sweden

Green's functions for electron and for particle-hole propagation are calculated for even alternant hydrocarbons. With the use of three parameters, accurate correspondence is achieved between calculated and observed spectra for ethylene, benzene, naphthalene, and anthracene. (Author)

AD-631 434 Fld. 7/4, 20/9
CFSTI Prices: HC $1.00 MF $0.50
INSTITUTE OF MODERN LANGUAGES INC WASHINGTON D C
IONIZATION OF THE HYDROGEN ATOM UNDER THE ACTION OF INTENSE ELECTROMAGNETIC RADIATION,
by A. D. Gazazian, and B. O. Chaltukian. Apr 66, 9p. Contract DA-44-009-AMC-1563 (T), Proj. DA-1C014501A34A
AERDL T-1832-66 ,TT 66-61088

Unclassified report

Trans. of Akademiya Nauk Armyanskoi SSR, Erevan. Doklady, v41 p27-32 1965.

Descriptors: (*Hydrogen, *Gas ionization), Electromagnetic fields, Polarization, Photons, Absorption, Electron transitions, Atomic orbitals, Ionization potentials, Probability, USSR

Consideration is given to the ionization of the hydrogen atom in a circularly polarized field of intensive electro -magnetic radiation with the absorption of a few light quanta. The calculations are also true for hydrogen-like atoms.

AD-631 453 Fld. 7/4
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF APPLIED CHEMISTRY
HIGH PRESSURES,
by E. Whalley. 1966, 3p.
NRC 8851

Unclassified report

Availability: Published in Chemistry in Canada Jan 1966. Copies to DDC users only.

Descriptors: (*Physical chemistry, High-pressure research), (*High-pressure research, Canada), Kinetic energy, Kinetic theory, Chemical reactions, Equations of state, Liquids, Gases, X-ray diffraction analysis, Dielectric properties, Thermoelectricity, Alloys, Copper alloy, Spectroscopy

The activities of the High Pressure Section, Division of applied Chemistry of the National Research Council of Canada, in the following fields of physical chemistry are described: chemical kinetics, chemical reactions, equation of state of liquids and gases, spectroscopy of high-pressure phases, X-ray diffraction, dielectric properties, and thermoelectric power of alloys.

AD-631 454 Fld. 7/4
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF RADIO AND ELECTRICAL ENGINEERING
CONCERNING AN ANALYTIC EXPRESSION FOR THE THERMAL TRANSPIRATION RATIO,
by J. P. Hobson. 1966, 3p.
NRC 8745

Unclassified report

Availability: Published in Vacuum v15 n11 p543-4. Copies to DDC users only.

Descriptors: (*Evapotranspiration, Equations), Vacuum, Pressure, Temperature, Neon, Argon, Canada

The expression for the thermal transpiration ratio of Ebert and Albrand (Vacuum, 13 (no.12):563 (1963)) is compared with that of Liang (J. Phys. Chem. 57:910 (1953)). Experimental data for neon and helium were obtained from Edmonds and Hobson (J. Vac. Sci, and Tech. 2:182 (1965)). The equation of Ebert and Albrand did not give as good a representation of the data as Liang's formula with appropriate choice of constants, but is regarded as being sufficiently accurate for some purposes.

AD-631 482 Fld. 7/4, 4/1
CFSTI Prices: HC $4.00 MF $0.75
UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF PHYSICS
FLUORESCENCE SPECTRA OF THE MOLECULAR ION O2 (+), N2 (+) AND CO (+) EXCITED BY VACUUM ULTRAVIOLET RADIATION.
Technical rept., Dec 61-Jul 65,
by D. L. Judge, and G. L. Weissler. 31 Aug 65, 111p. Rept. no. USC-VacUV-105,
Contract Nonr-228 (27)

Unclassified report

Rept. on Vacuum Ultraviolet Radiation Physics.

Descriptors: (*Fluorescence, Excitation), (*Oxygen, Fluorescence), (*Nitrogen, Fluorescence), (*Carbon monoxide, Fluorescence), Ultraviolet radiation, Photons, Spectra (Visible + ultraviolet), Molecular structure, Gas discharges, Line spectrum, Molecular energy levels, Diatomic molecules, Ions

Vacuum ultraviolet photon-gas interactions leading to fluorescence in the visible wavelength region are presented for the gases O2, N2 and CO. This fluorescence is wavelength analyzed, and the results are discussed in terms of either known molecular structure or structure implied by the present experimental results. It is argued that the observed fluorescence is primarily from excited states of molecular ions for each of the gases studied. The primary VUV radiation, obtained from a repetitive

condensed spark discharge through 50 microns of air, consisted of a number of bright source lines between 1000 and 500 A (12 to 24 eV). Each gas was studied in terms of the fluorescence resulting from excitation by several of the primary source lines, differing from each other by approx. 0.15 eV, an energy difference comparable to the separation of typical low lying vibrational levels. The fluorescence wavelength analysis was obtained with a high aperture Czerny-Turner type monochromator having a bandwidth of 40 to 70 A, the particular value selected being determined by the signal to noise ratio at the fluorescence photon counter. (Author)

AD-631 485 Fld. 7/4, 4/1, 20/9
CFSTI Prices: HC $1.10 MF $0.50
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA
STUDY AND EXPERIMENTAL WORK ON ATOMIC COLLISION PROCESSES OCCURRING IN ATMOSPHERIC GASES.
Technical progress letter-43 (Research memo),
by A. V. Phelps, and W. H. Kasner. 31 Aug 65,
4p. Rept. no. RM-65-6E2-113-M3,
Contract AF 29 (601)-6729, Proj. AF-5710,
Unclassified report

Descriptors: (*Atmosphere, Atomic properties), (*Nitrogen, Recombination reactions), (*Oxygen, Gas ionization), (*Electrons, Scattering), Ions, Gas discharges, Reaction kinetics, Carbon dioxide, Water vapor, Dissociation, Elastic scattering, Inelastic scattering, Probability, Transport properties

Progress of work in the following areas is reported: temperature dependence electron-cation recombination in N2-Ne mixtures; attachment and detachment in CO2-O2 mixtures and in pure water vapor; elastic and inelastic scattering cross sections for electrons in pure oxygen.

AD-631 511 Fld. 7/4, 20/2, 7/2
IIT RESEARCH INST CHICAGO ILL PHYSICS RESEARCH DIV
INFRARED LATTICE SPECTRA OF ALPHA-AL2O3 AND CR2O3.
Physical sciences research papers,
by R. Marshall, S. S. Mitra, P. J. Gielisse, J. N. Plendl, and L. C. Mansur. Apr 66, 6p. Contract AF 19 (628)-2418, Proj. AF-5621, Task 562105, AFCRL PSRP-213 ,AFCRL 66-238
Unclassified report

Availability: Published in The Journal of Chemical Physics v43 n8 p2893-4 Oct 15 1965. Copies to DDC users only.

Descriptors: (*Aluminum compounds, Spectra (Infrared)), (*Chromium compounds, Spectra (Infrared)), (*Infrared spectroscopy, Crystal lattices), Oxides, Wave transmission, Reflection, Polarization, Absorption spectrum

Infrared-active lattice vibrational spectra of alpha -Al2O3 and Cr2O3 were investigated by reflection and transmission measurements on single crystal samples and also by transmission on Nujol mulled Cr2O3. Single-crystal transmission data above 700/cm were assigned to combinations and overtones. (Author)

AD-631 550 Fld. 7/4, 7/2
HERCULES RESEARCH CENTER WILMINGTON DEL
THE ELECTROCHEMISTRY OF INORGANIC DIFLUORAMINO COMPOUNDS. II. SOLUTION CHEMISTRY AND ELECTROCHEMICAL REDUCTION OF DIFLUORAMINE,
by G. A. Ward, C. M. Wright, and A. D. Craig. 23 Apr 65, 7p. Contract DA-31-124-ARO (D)-62,
AROD 4136:11
Unclassified report

Availability: Published in Journal of the American Chemical Society v88 p713-8 Feb 20 1966. Copies to DDC users only.

Descriptors: (*Fluoroamines, Electrochemistry), Reduction (Chemistry), Solvents, Solutions, Ammonia, Polarographic analysis, Complex compounds

The mechanism of the electrochemical reduction of difluoramine was studied in water, protonic organic solvents, and aprotic solvents. In water and protonic solvents, such as alcohols, difluoramine undergoes a diffusion-controlled, four-electron reduction to ammonia. In aprotic solvents, such as acetonitrile and dimethyl sulfoxide, the reduction product is ammonia, but the reaction is not completely diffusion controlled. In these systems, ammonia is formed by reaction of the electrode products with the solvent. The effect of added proton donors was studied. In aprotic systems, the mechanism of the reaction is affected by repulsion of negatively charged intermediate species at the electrode surface. The effect of the nature of the supporting electrolyte on the repulsion phenomenon was studied. The half-wave potential of difluoramine was found to vary with the solvent used, and the values observed are correlated with the strength of solvation of HNF2. (Author)

AD-631 557 Fld. 7/4
CFSTI Prices: HC $1.60 MF $0.50
NAVAL RADIOLOGICAL DEFENSE LAB SAN FRANCISCO CALIF
SOLUBILITIES OF KR AND XE IN FRESH AND SEA WATER,
by David Wood, and Roger Caputi. 27 Feb 66, 17p. Rept. no. USNRDL-TR-988,
Unclassified report

Descriptors: (*Krypton, Solubility), (*Xenon, Solubility), Water, Sea water, Temperature

The PROBLEM: To determine the solubility of krypton and xenon in fresh water and seawater from 0C to 50C degrees. FINDINGS: The results, given in the form of Henry's constant, indicated a smoothly increasing function with temperature for both krypton and xenon. Henry's constant in seawater for both gases was approximately 25 % greater than the corresponding fresh water value. (Author)

AD-631 563 Fld. 7/4, 20/4
CFSTI Prices: HC $1.60 MF $0.50
POLITECNICO DI TORINO (ITALY) ISTITUTO DI MECCANICA APPLICATA
ANALYSIS OF SOME EXPERIMENTAL RESULTS ON THE DISSOCIATION OF DIATOMIC GASES IN THE SHOCK TUBE.
Technical note,
by Gianni Jarre. Jan 63, 20p. Rept. no. TN-23,T.N. 3
Contract AF 61 (052)-511,
AFOSR 4857
Unclassified report

Descriptors: (*Dissociation, *Gases), Shock tubes, Diatomic molecules, Reaction kinetics, Italy, Chemical equilibrium, Hydrogen, Nitrogen, Deuterium, Oxygen, Bromine, Iodine, Mathematical analysis

The experimental results, given by the recent shock tube technics, on the dissociation of diatomic gases are analyzed. A characteristic frequency of dissociation is derived, which allows one to correlate suitably the experiments on different gases. An elementary thermodynamic derivation of the chemical rate constants is presented. (Author)

AD-631 605 Fld. 7/4, 4/1
LYMAN LAB OF PHYSICS HARVARD UNIV CAMBRIDGE MASS
LIFETIME OF THE LOWEST EXCITED LEVEL OF N2,
by N. P. Carleton, and O. Oldenberg. 1 Dec 60,
4p. Contract AF 19 (628)-318,
AFCRL 62-1040
Unclassified report

Availability: Published in Journal of Chemical Physics v36 n12 p3460-3 Jun 15 1962. Copies to DDC users only.

Descriptors: (*Nitrogen, *Molecular energy levels), Electron transitions, Selection rules, Probability, Photons, Glow discharges, Band spectrum, Absorption spectrum, Continuous spectrum

The probability of transition of the forbidden Vegard -Kaplan system (A-triplet-Sigma-X-singlet-Sigma) was measured in N2, working from the definition of this probability as the ratio of number of photons emitted per second to number of excited molecules, both measured in the same discharge. The absolute intensity of the 0,6 Vegard-Kaplan band was measured as emitted from the discharge. Under identical conditions the population of molecules in the A-triplet-Sigma level was found by measuring the strength of absorption of the 1,0 first positive band. By calculation the observed loss (which is a sum of absorption by all rotational levels) was related to the absolute population of the excited level, in terms of the probability of transition of the first positive system. Measurements of absorption and emission give a value of (1.6 plus or minus 0.4) X 1000000 for the ratio of the transition probability of the first positive system to that of the Vegard-Kaplan system. From recent shock -tube measurements of the former transition probability a value of 2.0 (plus or minus0.9) sec was obtained for the lifetime of the A-triplet-Sigma state of N2. (Author)

AD-631 607 Fld. 7/4, 4/1
LYMAN LAB OF PHYSICS HARVARD UNIV CAMBRIDGE MASS
ACTIVE NITROGEN AT HIGH PRESSURE,
by J. F. Noxon. 6 Jul 61, 15p. Contract AF 19 (628)-318,
AFCRL 62-823
Unclassified report

Availability: Published in Journal of Chemical Physics v36 n4 p926-40 Feb. 15, 1962. Copies to DDC users only.

Descriptors: (*Nitrogen, *Molecular energy levels), Glow discharges, Band spectrum, High-pressure research, Recombination reactions, Electron transitions, Oxygen, Atomic energy levels

A pure nitrogen afterglow was studied spectroscopically at pressures up to 1 atm and up to several seconds after the discharge. The first positive bands of nitrogen continue to show an unchanged preferential enhancement of bands with $v' = 11$ at high pressure, but their decay with time, measured photoelectrically, indicates that at high pressure N (quadruplet-S) atoms must be removed by a more rapid process than recombination in triple collisions; it is suggested that this may be a two-body reaction with an oxide of nitrogen. Forbidden radiation from O, N, and N2 predominates over the first positive bands at high pressure, and a high degree of immunity toward deactivating collisions is shown to be required for the metastable states N (doublet P), O (singlet-S), and N2 (A-triplet-Sigma u +). The absolute intensity and decay of the forbidden radiation indicates that O (singlet-S) must be created in the afterglow while N (doublet-P), and to some extent N2 (A-triplet-Sigma u +) , survive from the discharge. The observations favor a long radiative lifetime near 1 sec for N2 (A-triplet-Sigma u +). (Author)

AD-631 608 Fld. 7/4, 4/1
LYMAN LAB OF PHYSICS HARVARD UNIV CAMBRIDGE MASS
MEASURED VARIATION OF THE ELECTRONIC TRANSITION MOMENT OF THE VEGARD-KAPLAN BANDS IN N2,
by N. P. Carleton, and C. Papaliolios. 12 Mar 62,

4p. Contract AF 19 (628)-318, AFCRL 62-1039

Unclassified report

Availability: Published in J. Quant. Spectrosc. Radiat. Transfer. v2 p241-4. Copies to DDC users only.

Descriptors: (*Nitrogen, *Electron transitions), (*Band spectrum, Nitrogen), Molecular energy levels, Excitation, Gas discharges, Moments, Intensity, Wave functions

Measurement was made of the relative intensities of several Vegard-Kaplan bands of N2 as emitted from a discharge through very pure N2. From the measured values, the dependence of the electronic transition moment upon vibrational states of the upper and lower levels of the transition was deducted. In calculating this, the r-centroid method of analysis was used and computed FranckCondon factors were taken into account.

AD-631 611 Fld. 7/4, 20/5
MICROWAVE LAB STANFORD UNIV CALIF
DOUBLET-E TO DOUBLET-T2 ABSORPTION SPECTRUM OF RUBY,
by G. K. Klauminzer, P. L. Scott, and H. W. Moos. 3 Sep 65, 6p. Rept. no. ML-1421, Contract Nonr-225 (78) ,ARPA Order-306-64

Unclassified report

Availability: Published in The Physical Review v142 n1 p248-50 Feb 4 1966. Copies to DDC users only.

Descriptors: (*Ruby, Absorption spectrum), (*Electron transitions, Ruby), Band spectrum, Line spectrum, Polarization, Molecular energy levels, Excitation, Crystals, Field theory

Four of the six possible components in the sharp-line absorption spectrum doublet-E0 (t2 (3)) to doublet-T2 (t2 (3)) were observed in a sample of 0.05% ruby cooled to 95K. The measured wavelengths and linewidths of the transitions are identical, within experimental error, to those calculated on the basis of observed absorptions to each of the excited levels from the quadruplet-A2 ground state. The polarizations and relative strengths of the transitions are in good agreement with the existing crystal-field-theory predictions of Tanabe and Sugano. (Author)

AD-631 625 Fld. 7/4
CFSTI Prices: HC $1.60 MF $0.50
LOUISIANA STATE UNIV BATON ROUGE DEPT OF CHEMISTRY
EXPERIMENTAL STUDY OF THE ELECTRICAL DOUBLE LAYER IN VERY DILUTE AQUEOUS SOLUTIONS.
Technical rept.,
by Paul Delahay, Robert de Levie, and Anna-Maria Giuliani. Feb 66, 12p. Rept. no. TR-60, Contract Nonr-1575 (04), Task 051-258,

Unclassified report

Descriptors: (*Electrical double layer, Measurement), (*Sodium compounds, Fluorides), Electrochemistry, Solutions, Voltage, Resistance (Electrical)

Two methods are described for the measurement of the double layer differential capacity in media of low conductivity, i.e. under conditions in which the conventional bridge method fails: (a) measurement of the change of potential caused by coulostatic charging with a small excursion of potential; (b) determination, under coulostatic conditions, of the time constant of the circuit comprising the double layer capacity in series with a large resistance. The first method is definitely the more convenient and slightly more accurate. Application is made to 0.001 to 0.00001 M sodium fluoride, and results agree with those calculated from the Gouy-Chapman theory for Grahame's capacities of the compact double layer. The coulostatic method is compared with the bridge method and some potential applications are mentioned. (Author)

AD-631 626 Fld. 7/4, 20/3
CFSTI Prices: HC $1.00 MF $0.50
LOUISIANA STATE UNIV BATON ROUGE DEPT OF CHEMISTRY
BIBLIOGRAPHY OF TECHNICAL REPORTS AND PUBLICATIONS FOR JUNE 1, 1961 TO AUGUST 31, 1965.
Final technical rept.,
by Paul Delahay. Feb 66, 3p. Rept. no. TR-61, Contract Nonr-1575 (04), Task 051-258,

Unclassified report

See also AD-268 123, -283 681, -283 682, -423 642, -600 842, -604 906, and -612 662.

Descriptors: (*Electrochemistry, Electrodes), (*Electrodes, Surface properties), Electric discharge, Zinc, Zinc alloys, Mercury, Electrical double layer, Transport properties, Ions, Reaction kinetics, Adsorption, Iodates, Electrodes, Electrical impedance, Measurement, Capacitance, Electrolytes

Fourteen technical reports (one in two parts) were prepared and fifteen papers have been published or are in press. In addition, the principal investigator wrote a book, 'Double Layer and Electrode Kinetics', Interscience, New York, 1965, 321 pages.

AD-631 677 Fld. 7/4, 7/2, 7/3
CFSTI Prices: HC $2.60 MF $0.50
ROCKET POWER INC PASADENA CALIF
RESEARCH ON CHEMICAL SYNTHESIS WITH MONOENERGETIC IONS.
Final technical rept., 1 Oct 64-30 Sep 65,
by Milton Farber. 22 Apr 66, 23p. Contract AF 49 (638)-1457,
AFOSR 0703

Unclassified report

Descriptors: (*Ions, Chemical reactions), (*Nitrobenzenes, Synthesis (Chemistry)), (*Fluorides, Ions), Nitrates, Benzenes, Nitrogen compounds, Ion sources, Condensation

A reaction system was developed which is based on the concept that select chemical products can be formed if ions and molecules are brought together in controlled manner. The system was employed for the study of NO2 (+) ion and benzene. Numerous exploratory fluorine chemistry experiments were carried out. In connection with the latter it was found that highly reactive, neutral, ion reaction products are capable of storage at liquid nitrogen temperatures, and may be used for reagent purposes. (Author)

AD-631 799 Fld. 7/4, 7/2
WENTWORTH INST BOSTON MASS
THE PHASE DIAGRAM OF THE BI3-SII4 SYSTEM AND ITS RELATIONSHIP TO ZONE REFINING.
Physical sciences research papers,
by A. F. Armington, and E. O. Fisk. 2 Sep 65, 7p. Contract AF 19 (604)-8503, Proj. AF-5620, Task 562004,
AFCRL 66-228 ,AFCRL PSRP-209

Unclassified report

Availability: Published in Journal of the Electrochemical Society v113 n2 p194-6 Feb 1966. Copies to DDC users only.

Descriptors: (*Boron compounds, Iodides), (*Silicon compounds, Iodides), (*Iodides, Phase studies), (*Zone melting, Iodides), Eutectics, Thermal analysis, Transformations

The phase diagram of the system BI3-SiI4 is evaluated and plotted. The system has a simple eutectic at 30 percent (by weight) of SiI4 and there is no indication of solid solubility of either components. The relationship of these results to the zoning of these materials is discussed. (Author)

AD-631 812 Fld. 7/4, 7/2
NATIONAL BUREAU OF STANDARDS WASHINGTON D C
HEAT OF FORMATION OF ALUMINUM FLUORIDE BY DIRECT COMBINATION OF THE ELEMENTS,
by Eugene S. Domalski, and George T. Armstrong. 16 Nov 64, 12p. Rept. no. Paper-69A2-335 ,ISSA-8-65
AFOSR 66-0568

Unclassified report

Availability: Published in Journal of Research of the National Bureau of Standards-A. Physics and Chemistry, v69A n2 p137-47 Mar-Apr 1965. Copies to DDC users only.

Descriptors: (*Aluminum compounds, Fluorides), (*Fluorides, Heat of formation), (*Heat of formation, Aluminum compounds), Halocarbon plastics, Aluminum, Fluorine, Combustion, Thermochemistry, Calorimetric analysis, Carbon compounds, Fluorides

The standard heat of formation of aluminum fluoride was calculated from the heats of combustion of Teflon and of aluminum-Teflon mixtures in fluorine. The heat measurements were made in a bomb calorimeter. C2F4 (solid polymer)+2F2 (g)=2CF4 (g), (1). Al (c)+3/2F2 (g)=AlF3 (c), (2). For reaction (1), (enthalpy) was found equal to -10,350.7 plus or minus 0.4/Jg (-247.43 plus or minus 0.01 kcal/monomole), and for reaction (2) (enthalpy) = (heat of formation) was calculated to be -1507.8 plus or minus 1.2 kJ/mole (-360.37 plus or minus 0.29 kcal/mole). The latter uncertainties are the computed standard deviations of the means. The calculated standard heat of formation of aluminum fluoride is estimated to be accurate to within plus or minus 6.6 kJ/mole (1.6 kcal/mole). The measurements on Teflon were combined with existing data and the heat of formation of carbon tetrafluoride was calculated to be -221.8 kcal/mole. (Author)

AD-631 814 Fld. 7/4, 7/5
BRITISH COLUMBIA UNIV VANCOUVER DEPT OF CHEMISTRY
THE RED EMISSION BANDS OF MOLECULAR OXYGEN,
by J. S. Arnold, R. J. Browne, and E. A. Ogryzlo. 19 Apr 65, 8p. Contract AF-AFOSR-158-63, DRB-9530-31

Unclassified report

Availability: Published in Photochemistry and Photobiology, v4 p963-9 1965. Copies to DDC users only.

Descriptors: (*Oxygen, *Band spectrum), Emissivity, Chemiluminescence, Excitation, Spectrum (Visible + ultraviolet), Molecular energy levels

The temperature dependence and the absolute emission intensity of the 6340A band of molecular oxygen have been measured. The results indicate that the emitting pair of molecules is not bound and possesses a radiative half life of about 25 msec. The implications of these results on some chemiluminescent reactions are discussed. (Author)

AD-631 195 See Fld. 7/2

AD-631 217 See Fld. 7/3

AD-631 218 See Fld. 7/3

AD-631 253 See Fld. 7/3

AD-631 276 See Fld. 9/6

AD-631 343 See Fld. 7/2

AD-631 382 See Fld. 20/2

AD-631 432 See Fld. 11/6

AD-631 567 See Fld. 11/9

AD-631 593 See Fld. 7/2

AD-631 616 See Fld. 20/13

AD-631 617 See Fld. 6/18

AD-631 683 See Fld. 7/5

AD-631 698 See Fld. 20/12

AD-631 721 See Fld. 21/2

AD-631 785 See Fld. 7/5

AD-631 794 See Fld. 7/2

AD-631 796 See Fld. 20/6

AD-631 807 See Fld. 8/10

AD-631 831 See Fld. 11/9

7/5. RADIO AND RADIATION CHEMISTRY

AD-631 257 Fld. 7/5, 7/2, 8/4
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF APPLIED CHEMISTRY
EXTRACTION AND SPECTROPHOTOMETRIC DETERMINATION OF THORIUM WITH 8-QUINOLINOL,
by Katsumi Goto, D. S. Russell, and S. S. Berman. 1966, 4p.
NRC 8864

Unclassified report

Availability: Published in Analytical Chemistry v38 p493-5 Mar 1966. Copies to DDC users only.

Descriptors: (*Thorium, Solvent extraction), Spectroscopy, Quinolines, Alcohols, Salts, Hydrolysis, Sand, Chemical analysis, Canada

It is shown that previous attempts to extract thorium with 8-quinolinol were conducted under conditions which resulted in a concentration of the solvent insufficient to prevent hydrolysis of the thorium quinolinolate precipitate. An improved method was developed and results of its application to the analysis of monazite sand is reported.

AD-631 366 Fld. 7/5, 7/3
CFSTI Prices: HC $1.60 MF $0.50
RESEARCH TRIANGLE INST DURHAM NC
PHOTOCHEMISTRY OF 2-ALKYLAMINOPHENOXAZ -3-ONES. II.
Technical rept.,
by M. C. Wani, and Samuel G. Levine. 1966, 19p. Contract DA-31-124-ARO (D)-169,DA-ARO (D)-31-124-G250 Proj. DA-20014501B13A
AROD 3418:3

Unclassified report

Descriptors: (*N-heterocyclic compounds, Photochemistry), (*O-heterocyclic compounds, Photochemistry), (*Photochemistry, Polycyclic compounds), Amines, Ketones, Imines, Azines, Ethers, Photolysis, Synthesis (Chemistry)

The photochemistry of 2-dialkylaminophenoxaz-3-ones was investigated. In general these compounds were found to be more photo-reactive than the corresponding monoalkylaminophenoxaz-3-ones. The 2-dimethylaminophenoxaz-3-one underwent photochemical demethylation. Irradiation of the 2-polymethyleneiminophenoxaz-3-ones gave different products depending upon the size of the polymethyleneimine ring. Propyl-, pentyl-, and hexyl-methyleneimine phenoxazones gave novel pentacyclic dicarbomethoxy dimethyl alkyleneoxazolino phenoxazines. Stable dihydrophenoxaz-3-ones were obtained by the reduction of butyl-, pentyl-, and hexyl-methyleneimine phenoxazones.

AD-631 481 Fld. 7/5, 7/2, 20/8
CFSTI Prices: HC $1.60 MF $0.50
ILLINOIS UNIV URBANA DEPT OF CHEMISTRY AND CHEMICAL ENGINEERING
MOSSBAUER STUDIES OF DIVALENT AND TRIVALENT FE57 IN COSO4 AND COSO4.7H2O,
by R. Ingalls, C. J. Coston, G. De Pasquali, H. G. Drickamer, and J. J. Pinajian. 1966, 18p. Rept. no. COO-1198-355,
Contract AT (11-1)-1198,Nonr-1834 (05)

Unclassified report

Descriptors: (*Iron, *Mossbauer effect), (*Cobalt compounds, Sulfates), Temperature, Pressure, Nuclear isomeres, Band spectrum, Field theory, Hydrates, Doppler effect, Gamma emission, Intensity

Results are reported of a Mossbauer study of Co57 (Fe57) in CoSO4 as a function of temperature at atmospheric pressure and as a function of pressure at room temperature. In addition to the expected divalent Fe57 component, a trivalent component was also observed, the relative intensity of which decreases with increasing temperature or pressure. The isomer shifts of both charge states also decrease with increasing temperature or pressure. The behavior of the large quadrupole splittings observed in each charge state is analyzed using the crystal field approximation. Similar results were also found in a temperature study of CoSO4.7H2O at atmospheric pressure. The relative intensity of the trivalent Fe57 component is considerably greater in the hydrate and also decreases with increasing temperature. (Author)

AD-631 683 Fld. 7/5, 7/4
CFSTI Prices: HC $2.60 MF $0.50
DEPARTMENT OF THE NAVY WASHINGTON D C
METHODS OF SPECTRAL ANALYSIS, PART II,
by V. L. Levshin. 1966, 27p. Rept. no. Trans-2073-Pt-2,
TT 66-61120

Unclassified report

Trans. of mono. Metody Spektralnogo Analiza, Moscow, 1962. See also AD-629 671.

Descriptors: (*Luminescence, Spectroscopy), Spectrum analyzers, Photometers, Colorimetric analysis, Fluorometers, Spectrophotometers, Polariscopes, Fluoroscopes, Chromatographic analysis, USSR

Contents: (translation from Chapter 19, Section 5 of the 'Analysis of Luminescence, Moscow Univ. Pub. House, 1962): Sources of excitation of luminescence; light filters and monochromotors; photometers; spectrograph and spectrophotometers; polarimeters and polariscopes; phosphoroscopes and fluoroscopes; special apparatus used in a qualitative luminescence analysis; luminescent microscopes.

AD-631 785 Fld. 7/5, 7/2, 7/4
CFSTI Prices: HC $3.00 MF $0.75
TENNESSEE UNIV KNOXVILLE DEPT OF PHYSICS
THE NU-2 FUNDAMENTAL VIBRATION-ROTATION BAND OF DITRITIUM OXIDE,
by Raymond A. Carpenter, Norman N. Gailar, and Alvin H. Nielsen. Jul 65, 93p. Rept. no. Scientific-1,
Contract AF 19 (628)-4323, Proj. AF-8603, Task 860303,
AFCRL 65-508

Unclassified report

Descriptors: (*Tritiated compounds, *Band spectrum), Heavy water, Water vapor, Absorption spectrum, Spectrum (Infrared), Molecular spectroscopy, Molecular structure, Moments, Inertia, Chemical bonds, Vibration, Rotation

The nu-2 fundamental vibration-rotation band of the dititium oxide vapor spectrum was measured by means of a prism-grating spectrometer. An analysis of the rotational structure was carried out. The band center and the values of the rotational constants A, B, and C for the ground state and excited state, consistent with the data for J through six, and consitent with extrapolations from water and dideuterium oxide, were determined. They are nu-0 = 995.37/cm., A (O) = 11.301/cm., B (O) = 4.837/cm., C (O) = 3.344/cm., A (V) = 11.982/cm., B (V) = 4.868/cm., and C (V) = 3.316/cm. (Author)

AD-631 787 Fld. 7/5, 21/2, 19/4
CFSTI Prices: HC $1.10 MF $0.50
INDIANA UNIV BLOOMINGTON DEPT OF CHEMISTRY
SPECTROMETRIC STUDIES OF FAST REACTIONS.
Final rept.,
by Edward J. Bair. 28 Feb 66, 11p. Contract AF 49 (638)-1257, Proj. AF-9710, Task 971003,
AFOSR 66-0596

Unclassified report

Descriptors: (*Chemical reactions, Spectroscopy), (*Photolysis, Explosions), (*Ozone, Photolysis), (*Hydrazine, Photolysis), Spectrophotometers, Design, Free radicals, Reaction kinetics, Oxygen, Amines, Band spectrum, Kinetic energy, Combustion, Simulation

The project was undertaken in order to develop and demonstrate new spectroscopic procedures for studying both the detailed path and the elementary processes of photolytically initiated explosions similar in some respects to combustion reactions which also proceed by free radical and energy chain processes. Following the development of a highly reproducible reaction system, different spectroscopic features of the same system are studied by repeating the reaction. Special precautions to ensure that the system is homogeneous tend to isolate the chemical dynamics part of the combustion problem from the fluid dynamics part. With long absorption path and low sample pressure the time resolution of the measurements is reasonably comparable with the time between intermolecular collisions. A fast, high resolution spectrometer specifically designed for this work resolves transient energy features such as the rotational fine structure of free radical absorption with a time resolution of about a microsecond. In the photolytic explosion of ozone the time dependence of the ozone concentration, ozone vibrational energy, vibrational energy of the oxygen product in levels up to 23 and the rotational-kinetic temperatures were correlated. In the photolytic explosion of Hydrazine the relative time dependence of NH2 radicals, NH radicals, hydrazine and a new transient spectrum not yet fully identified were compared. (Author)

AD-631 458 See Fld. 11/7

AD-631 814 See Fld. 7/4

Field 8-EARTH SCIENCES AND OCEANOGRAPHY

8/2. CARTOGRAPHY

AD-631 582 Fld. 8/2
CFSTI Prices: HC $1.10 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
INTERPRETOSCOPE NEW PHOTOGRAMMETRIC DEVICE PRODUCED BY THE VEB C. ZEISS-JENA,
by J. Konieczni. 23 Mar 66, 7p. Rept. no. FTD-TT-65-1727,
TT 66-61104

Unclassified report

Unedited rough draft trans. of Przeglad Geograficzny (Poland) v36 n12 p475-6 1964.

Descriptors: (*Photogrammetry, Instrumentation), (*Photointerpretation, Photogrammetry), USSR

AD-631 669 Fld. 8/2
CFSTI Prices: HC $3.00 MF $0.50
NEW YORK UNIV N Y LAB FOR ELECTRO-SCIENCE RESEARCH
A MATHEMATICAL MODEL FOR THE ANALYSIS OF CONTOUR-LINE DATA.
Scientific technical rept.,
by Stephen P. Morse. Oct 65, 54p. Rept. no. TR-400-124,
Contract AF-AFOSR-24-65, Proj. AF-9769, Task 976902,
AFOSR 66-0694

Unclassified report

Descriptors: (*Mathematical models, *Mapping), Algorithms, Programming (Computers), Maps, Map projection

This paper develops a mathematical model for the study of contour line data. Formal definitions are given for the various classes of contour lines found on a contour map. The concept of cliff lines is introduced and the properties of both contour lines and cliff lines are investigated. The objective of the paper is to lay a foundation for the development of algorithms that will facilitate the digital computer solution of problems involving contour line data. (Author)

AD-631 670 Fld. 8/2
CFSTI Prices: HC $2.00 MF $0.50
NEW YORK UNIV N Y LAB FOR ELECTRO-SCIENCE RESEARCH
ANALYSIS OF A CONTOUR MAP ON A CLOSED SURFACE.
Scientific technical rept.,
by Stephen P. Morse. Sep 65, 39p. Rept. no. TR-400-123,
Contract AF-AFOSR-24-65, Proj. AF-9769, Task 976902,
AFOSR 66-0693

Unclassified report

Descriptors: (*Maps, *Terrain), Mapping, Map projection, Curve fitting

The various components of a contour map are defined, and a point of view is introduced that aids in developing insight into the properties of contour maps. Contour lines are the lines of intersection of a surface with reference surfaces. The contour lines can be classified into four classes: positive, negative, maximum, and minimum. If the surface is closed, such as the Earth's surface, positive and negative contour lines are always closed curves. Where the surface is perpendicular to the reference surfaces, a cliff is formed. A cliff line on a contour map is characterized by a merger of different contour lines. There is a graphical technique for determining where the various contour lines enter and leave a cliff line. A method exists for truncating the contour map so that it covers only a portion of a closed surface and still maintains the closed-curve property of contour lines. By defining an outer boundary, one is able to talk about the interior and exterior of those contour lines that are closed curves. Lines of slope are lines that are everywhere perpendicular to the contour lines. Slope contour lines are contour lines for the slope of the surface. The former is concerned with the direction of the gradient, the latter with its magnitude. (Author)

AD-631 716 Fld. 8/2, 12/1
CFSTI Prices: HC $2.00 MF $0.50
NORTHWESTERN UNIV EVANSTON ILL DEPT OF GEOLOGY
THE FOURIER SERIES MODEL IN MAP ANALYSIS.
Technical rept.,
by William R. James. Apr 66, 44p. Rept. no. TR-1,
Contract Nonr-1228 (36), Proj. NR-388 078,
Unclassified report

Descriptors: (*Mapping, *Fourier analysis), (*Series, Fourier analysis), Maps, Curve fitting, Programming (Computers), Geology, Geography

During the past several years the double Fourier Series has been applied to the analysis of contour-type maps as an alternative to the more commonly used polynomial model. The double Fourier Series has high potential in the study of areal variations, inasmuch as a succession of trend maps based on decreasing wavelengths of the harmonic function can readily be prepared. Such maps are useful in distinguishing broad-scale regional effects from smaller-scale local fluctuations superimposed on the larger-scale trends. This report reviews some aspects of Fourier analysis, and shows the relation of the Fourier model to the general linear model in terms of the coefficient array and the sq Z array that expresses the variance contributions of the individual coefficients. The analogy between trend analysis and analysis of variance designs (nested models and rowcolumn models) is pointed out, and it is shown that the double Fourier Series can be used to summarize the directional properties of areally-distributed data. An Appendix lists computer programs for double Fourier analysis of gridded map data, and for continuous symbol maps of double Fourier trends and residuals. (Author)

AD-631 277 See Fld. 8/5

AD-631 404 See Fld. 3/2

AD-631 498 See Fld. 14/2

8/3. DYNAMIC OCEANOGRAPHY

AD-631 518 Fld. 8/3, 14/2
ARMY COASTAL ENGINEERING RESEARCH CENTER WASHINGTON D C
AN OCEAN WAVE DIRECTION GAGE,
by Leo C. Williams. Feb 66, 17p. Rept. no. R.1-66,

Unclassified report

Prepared for presentation at the National Marine Sciences Instrumentation Symposium on Oceanographic Sensors and Expendable Instrumentation (3rd), 21-23 Apr 65, Miami, Fla.

Availability: Published in Marine Sciences Instrumentation v3 p257-71 1965. Copies to DDC users only.

Descriptors: (*Flowmeters, Ocean waves), (*Ocean waves, Direction finding), (*Oceanographic equipment, Flowmeters), Ultrasonic radiation, Direction finding signals, Ocean currents, Water waves, Monitors, Recording systems, Tests

This paper outlines laboratory and short-term field testing of the use of an ultrasonic flow device for determining the direction of approach of ocean waves, The ultrasonic flowmeter measures the bidirectional flow of water past a pair of sensing elements. The direction of flow sensing is in a plane in line with the sensing elements. The output of the ultrasonic flowmeter is fed to a strip chart recorder which indicates the relative magnitude of the water flow. Thus alignment of the water flowmeter into an ocean wave train may provide the direction of approach of the wave. (Author)

AD-631 267 See Fld. 13/10

AD-631 421 See Fld. 8/10

8/4. GEOCHEMISTRY

AD-631 257 See Fld. 7/5

8/5. GEODESY

AD-631 212 Fld. 8/5, 22/3
CFSTI Prices: HC $4.60 MF $0.50
NAVAL WEAPONS LAB DAHLGREN VA
DETERMINATION OF THE EARTH'S GEOID BY SATELLITE OBSERVATIONS.
Technical rept.,
by Richard J. Anderle. 26 Mar 66, 41p. Rept. no. NWL-2027,

Unclassified report

Descriptors: (*Geodesics, *Satellite tracking systems), Earth (Planet), Configuration, Determination, Astronomical geodesics, Satellites (Artificial)

Determinations of the geoid made by different authors have differed by more than forty meters in some geographic locations. The authors differed in the observations employed in the number of gravity coefficients they determined, and in a number of details in the method of solution. Experiments conducted with Doppler observations on satellites have shown moderate variations (rarely as much as 30 meters) in the geoid determined if the number of satellite orbital inclinations employed is reduced by one. Reduction of the number of gravity parameters used to represent the geoid also resulted in moderate variations in the principal geoid features, except under special circumstances which are described. Reducing the number of weeks of observations did not produce deviations greater than 25 meters. However, reducing the number of observing stations in addition resulted in distortions of the computed geoid which reached 100 meters. It appears that the most recent geoid heights determined from satellite observations are correct to about 20 meters at any location and that observational data being obtained and techniques of computation being utilized should improve the accuracy to 10 meters or better. (Author)

AD-631 277 Fld. 8/5, 8/2, 9/3, 17/7
CFSTI Prices: HC $1.10 MF $0.50
ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER WASHINGTON D C
RESULTS OF A SYMPOSIUM ON APPLICATION OF ELECTRONIC TECHNOLOGY FOR THE MEASUREMENT OF DISTANCES,
by G. M. Karlov. Mar 66, 10p. Rept. no. FSTC-HT-23-70-66,
TT 66-61050

Unclassified report

Trans. of Geodeziya i Kartografiya n11 p25-9 Nov 1965.

Descriptors: (*Distance-measuring equipment, Electronics), (*Range finding, Electronic equipment), (*Geodesics, Instrumentation), Radio equipment, Optical equipment, Specifications, Symposia, East Germany, Electrooptics, Surveying

Brief specifications are given for several modern photo- and radio-range finders developed in E. Germany, USSR, Hungary and Czechoslovakia; these devices were described, discussed and demonstrated at a symposium held in Dresden, E. Germany from 11 to 21 May 1965. The need to achieve a further weight reduction and improvement in accuracy of existing range finders was stressed. (Author)

AD-631 444 Fld. 8/5, 22/3
CFSTI Prices: HC $1.10 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
ON THE QUESTION OF EQUALIZATION OF OUTER -SPACE TRIANGULATION,
by A. A. Kryzhanovskii. 23 Mar 66, 7p. Rept. no. FTD-TT-65-1732,

Unclassified report

Unedited rough draft trans. of Geodeziya i Kartografiya (USSR) n1 p24-5 1965.

Descriptors: (*Astronomical geodesics, *Satellite tracking systems), Least squares method, Geodesics, Orbital trajectories, USSR

AD-631 827 Fld. 8/5
CFSTI Prices: HC $1.00 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
NEW APPROACHES TO COMPUTING GEOIDAL HEIGHTS AND THEIR COMPARISON TO THE CLASSICAL GEODETIC METHOD,
by F. T. Heuring. Apr 64, 12p. Rept. no. TG-564,
Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Geodesics, Potential theory)

AD-631 745 See Fld. 8/10

AD-631 746 See Fld. 8/10

8/6. GEOGRAPHY

AD-631 516 Fld. 8/6, 5/3, 2/2
CFSTI Prices: HC $1.00 MF $0.50
RAND CORP SANTA MONICA CALIF
LAND CONCENTRATION AND INCOME DISTRIBUTION IN SEVERAL LATIN AMERICAN COUNTRIES,
by Delbert A. Fitchett. Apr 66, 22p. Rept. no. P-3341,
Unclassified report

Descriptors: (*Rural areas, Latin America), (*Economics, Latin America), Agriculture, Argentina, Brazil, Chile, Colombia, Ecuador, Guatemala, Peru

Contents: How land is distributed among farms; land as an economic resource; land as a source of economic and political power. It appears that agricultural income is not as highly concentrated as is agricultural land or power in this sector. It does seem to be the case, however, that higher income and/or power concentrations are characteristic of those countries which also tend to have higher concentrations of farmland. (Author)

AD-631 707 Fld. 8/6, 22/2
CFSTI Prices:MF $0.75
NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL WASHINGTON D C AD HOC COMMITTEE ON GEOGRAPHY
SPACECRAFT IN GEOGRAPHIC RESEARCH.
1965, 112p.
NAS-NRC Pub-1353
Unclassified report

Rept. of a Conference on the Use of Orbiting Spacecraft in Geographic Research, held at the National Aeronautics and Space Administration Manned Spacecraft Center, Houston, Texas, Jan 28-30, 1965.

Availibility: National Academy of Sciences, 2101 Constitution Ave., N. W., Washington, D. C. 20418, HC$3.00.

Descriptors: (*Geography, *Spacecraft), (*Photogeology, Spacecraft), (*Aerial photography, Spacecraft), Aerial reconnaissance, Scientific satellites, Orbital trajectories, Symposia, Research program administration, Hydrology, Geology, Natural resources, Mapping, Infrared photography

The Conference on the Use of Orbiting Spacecraft in Geographic Research outlined in a three-day session the principal benefits to the science of geography expected from operating cameras, infrared scanners, imaging radars, and other remote sensors in earth-orbiting spacecraft. The benefits from the new data on earth-surface phenomena include both scientific advances and practical applications in the civilian economy. General recommendations made by the Conference include the following: a vigorous effort should be made to plan the management of the great quanity and variety of data to be obtained; the international nature of a geographic spacecraft program and the need for cooperation of scientists in many countries should be emphasized; and field testing programs in well-known areas are needed to explore capabilities of specific sensors. Specific detailed recommendations were made by separate working panels in each of eight subfields: Energy and Water Budget; Geomorphology and Glaciology; Plant Cover and Soils; Resource Utilization; Settlement, Population, and Historical Geography; Urban Data and Data Systems; Transportation and Linkages; and Mapping, Imagery, and Data Processing. (Author)

AD-631 725 Fld. 8/6
CFSTI Prices: HC $1.10 MF $0.50
NORTHWESTERN UNIV EVANSTON ILL DEPT OF GEOGRAPHY
A PROBABILITY LAW OBTAINED BY COMPOUNDING THE POISSON AND HALF-NORMAL PROBABILITY LAWS.
Technical rept.,
by Michael F. Dacey. Dec 65, 10p. Rept. no. TR-4,
Contract Nonr-1228 (35), Proj. NR-389142,
Unclassified report

Descriptors: (*Geography, *Probability), Distribution, Statistical functions, Mapping

AD-631 726 Fld. 8/6
CFSTI Prices: HC $2.60 MF $0.50
NORTHWESTERN UNIV EVANSTON ILL DEPT OF GEOGRAPHY
SOME OBSERVATIONS ON A TWO-DIMENSIONAL LANGUAGE.
Technical rept.,
by Michael F. Dacey. Dec 65, 28p. Rept. no. TR-7,
Contract Nonr-1228 (35), Proj. NR-389142,
Unclassified report

Descriptors: (*Geography, *Language), Context free grammars, Pattern recognition, Mapping

A family of two-dimensional languages of a type formulated by Kirsch for generation of a pictorial source (a right triangle) is shown to define a mathematical group. (Author)

AD-631 728 Fld. 8/6
CFSTI Prices: HC $2.60 MF $0.50
NORTHWESTERN UNIV EVANSTON ILL DEPT OF GEOGRAPHY
FOUR PROPERTIES OF TWO DIMENSIONAL RANDOM POINT PATTERNS.
Technical rept.,
by Michael F. Dacey. Dec 65, 21p. Rept. no. TR-6,
Contract Nonr-1228 (35), Proj. NR-389142,
Unclassified report

Descriptors: (*Geography, Pattern recognition), Distribution, Stochastic processes, Mapping

Four properties of patterns formed by the random arrangement of points in a two dimensional region are stated. Part I gives order statistics for the areal uniform pattern which is defined by the probability law with distribution function $F(x) = x^{(2)}$, $0 < x < 1$. These order statistics are used in Part II to establish a relation for the moments of distance between points in a random arrangement of points in (i) the unit disk and (ii) the Euclidean plane. Part III compares (iii) the average distance between all pairs of points in a square array of m (2) points, and (iv) the expected distance between two points randomly placed in a square of the same dimensions. It is shown that the lattice distance approaches the measure of the square for even small values of m. Part IV obtains order distance for points in the Euclidean plane as a limiting result of order distance for $n + 1$ points randomly located in a square with unit area. (Author)

AD-631 733 Fld. 8/6, 13/6, 15/5
CFSTI Prices: HC $13.60 MF $1.00
WILSON NUTTALL RAIMOND ENGINEERS INC CHESTERTOWN MD
TROPICAL ENVIRONMENTAL/MOBILITY STUDIES, PANAMA, 1961 (SWAMP FOX I).
Technical rept.,
by James Duke, William Grenke, and James Roberts. Mar 63, 136p. Contract DA-44-177-TC-393, Task 1D021701A04702,
TRECOM TR-63-19
Unclassified report

Descriptors: (*Mobility, Panama), (*Trafficability, *Panama), (*Geography, Panama), (*Transportation, Panama), Tropical tests, Army equipment, Vehicles, Climatology, Meteorology, Social sciences, Geology, Terrain, Hydrology, Soils, Soil mechanics, Plants (Botany)

During Operation Swamp Fox I this study was designed to describe all factors of the tropical forest environment of eastern Panama which affect overland movement. Topics covered are climatology and meteorology, geology, physiography, soils, trafficability, hydrography, botany, and cultural geography. Included are field observations and literature reviews. It is concluded that the major deterrents to mobility in the area traversed by Swamp Fox I were slippery soils on slopes, narrow gullies, and dense jungle growths. It was also concluded that the area traversed by Swamp Fox I was not in all respects typical of surrounding areas. (Author)

AD-631 751 Fld. 8/6
CFSTI Prices: HC $2.60 MF $0.50
NORTHWESTERN UNIV EVANSTON ILL DEPT OF GEOGRAPHY
MEASURES OF DISTANCE FROM A RANDOMLY LOCATED POINT TO NEIGHBORING LATTICE POINTS FOR RECTANGULAR AND HEXAGONAL POINT LATTICES.
Technical rept.,
by Michael F. Dacey. Dec 65, 25p. Rept. no. TR-3,
Contract Nonr-1228 (35) Task 389-142,
Unclassified report

Descriptors: (*Geography, Distribution), Statistical functions, Distribution functions, Numerical analysis, Mapping

This report lists the probability density function and distribution function of distance from a point randomly located in a polygon to the ith nearest corner for the following polygons: square, diamond, and rectangle. Also, low order moments and moment constants are tabulated for these order distances. The three lowest orders of distance for the square and the diamond pertain identically to the three lowest orders of distance for the square and hexagonal lattices, and the two lowest orders of distance for the rectangle apply identically to the two lowest orders of distances for the primitive rectangular lattice. (Author)

AD-631 789 Fld. 8/6
CFSTI Prices: HC $1.10 MF $0.50
NORTHWESTERN UNIV EVANSTON ILL DEPT OF GEOGRAPHY
NUMERICAL MEASURES OF RANDOM SETS.
Technical rept.,
by Michael F. Dacey. Dec 65, 24p. Rept. no. TR-5,
Contract Nonr-1228 (35) Task 389-142,
Unclassified report

Descriptors: (*Geography, *Set theory), Measure theory, Numerical analysis, Mapping

This report tabulates moments, moment constants and, except for 3 below, the cumulative distribution function of (1) distance between two points randomly and independently placed in a line segment, disk or sphere, (2) distance between two points randomly and independently placed in a rectangle, and (3) distance from a selected point to the nearest point in a collection of (n + 1) points randomly and independently placed in a square. The results of part 3 provide measures for analyzing the boundary bias that occurs in map analysis based on spacing measures, and a procedure is described that is sometimes effective in eliminating boundary bias. (Author)

AD-631 756 **See Fld. 15/3**

AD-631 757 **See Fld. 15/3**

AD-631 758 **See Fld. 15/3**

AD-631 759 **See F" " 15/3**

AD-631 760 **See Fig. 15/3**

AD-631 761 **See Fld. 15/3**

AD-631 762 **See Fld. 15/3**

AD-631 763 **See Fld. 15/3**

8/7. GEOLOGY AND MINERALOGY

AD-631 338 Fld. 8/7, 8/14
CFSTI Prices: HC $3.00 MF $0.50
CALIFORNIA UNIV BERKELEY DEPT OF GEOLOGY AND GEOPHYSICS
PALEOMAGNETISM OF LATE MESOZOIC ROCKS IN NORTHERN CALIFORNIA: STRUCTURAL SIGNIFICANCE.
Final rept., pt. 3, Jul 63-Dec 64,
by C. Sherman Gromme', and Ronald T. Merrill. Jan 65, 56p. Contract AF 19 (628)-2386, Proj. AF-8623, Task 862301,
AFCRL 65-83-Pt-3
Unclassified report

Descriptors: (*Rock (Geology), Magnetic properties), (*Terrestrial magnetism, *Structural geology), (*Petrology, Terrestrial magnetism), Igneous rock, California, Geology

Directions of natural remanent magnetization have been determined at ten sites in the late Jurassic Guadalupe igneous complex and Bucks Lake batholith in the western Sierra Nevada, California. Paleomagnetic pole positions from these two plutons agree with one another and with other late Jurassic and Cretaceous poles from North America. These plutons, which are located 150 miles apart, have therefore been little affected by later tectonic events. The pole positions are preliminary only, and may be subject to slight modification after removal of secondary components of NRM by a.c. demagnetization of all specimens. One or more geomagnetic field reversals appear to be recorded in the Bucks Lake batholith, but possibly the NRM in titanohematite in both the plutons has been self-reversed. Igneous rocks of the Franciscan Formation in Marin County have provided a pole position which is greatly discordant to those mentioned: this discordance may be due to tectonic deformation or possibly to anomalous geomagnetic variation. (Author)

AD-631 520 Fld. 8/7
ARMY COASTAL ENGINEERING RESEARCH CENTER WASHINGTON D C
FACTORS AFFECTING BEACH NOURISHMENT REQUIREMENTS, PRESQUE ISLE PENINSULA, ERIE, PENNSYLVANIA,
by Dennis W. Berg. Feb 66, 10p. Rept. no. R.3-66,
Unclassified report

Prepared for presentation at the Conference on Great Lakes Research (8th), Michigan Univ., Ann Arbor, Mar 65.

Availability: Published in Great Lakes Research Div. Michigan Univ. pub-13 p214-21 1965. Copies to DDC users only.

Descriptors: (*Great Lakes, *Beaches), Marine geology, Terrain, Erosion, Sand Sedimentation, Pennsylvania

Analysis of available data on Presque Isle Peninsula, Erie, Pennsylvania, indicates apparent correlation of initial high erosion rates of placed beach fill with sand size characteristics of the fill and the mean level of Lake Erie for the period over which measured losses occur. Although erosion of the fill has been more than anticipated, the data indicate that nourishment requirements for replenishing the beaches, should decrease as the beach profiles become readjusted through selective sorting of the fill material to incident wave forces reaching the peninsula. (Author)

AD-631 411 **See Fld. 5/1**

AD-631 437 **See Fld. 8/11**

AD-631 686 **See Fld. 8/10**

8/10. PHYSICAL OCEANOGRAPHY

AD-631 421 Fld. 8/10, 8/3
CFSTI Prices: HC $4.60 MF $0.50
NAVAL OCEANOGRAPHIC OFFICE WASHINGTON D C
ORDERS OF MAGNITUDE OF OCEANOLOGICAL CHARACTERISTICS,
by A. N. Gezentsvei. 1966, 44p. Rept. no. Trans-260,
TT 66-61084
Unclassified report

Poryadki Velichin Okeanologicheskikh Kharakteristik, Trans. of Akademiya Nauk SSSR. Institut Okeanologii. Trudy, v66 p91-124 1963.

Descriptors: (*Oceanology, Numerical methods and procedures), Atlantic Ocean, Pacific Ocean, Temperature, Salinity, Density, Ocean currents, Velocity, Differential equations, Tables, USSR

For analysis of differential equations governing different processes in the ocean it is necessary to know the orders of magnitude of the terms of these equations. Here are compiled tables of orders of magnitude of different derivatives of temperature, salinity and density of water and current velocity. Data are given for three regions of the World Ocean: South and North Atlantic and North Pacific. Some conclusions concerning physical conditions in the given regions were drawn. (Author)

AD-631 531 Fld. 8/10, 20/13
GEOLOGICAL SURVEY MENLO PARK CALIF
HEAT FLOW THROUGH THE ARCTIC OCEAN FLOOR: THE CANADA BASIN-ALPHA RISE BOUNDARY,
by Arthur H. Lachenbruch, and B. Vaughn Marshall. 11 Oct 65, 27p. Proj. NR-307-275 ,NR-307-107
Unclassified report

Availability: Published in Journal of Geophysical Research v71 n4 p1223-48 Feb 15 1966. Copies to DDC users only.

Descriptors: (*Heat transfer, *Arctic ocean), Ocean bottom, Thermal conductivity, Marine geophysics, Instrumentation, Ice islands

Twenty heat-flow measurements were made from drifting ice in a 100-km equidimensional region on the boundary between the Alpha rise and the Canada basin in the central Arctic Ocean. The heat flow in the basin is uniform (1.41 plus or minus 4% micro cal/sq cm sec) over a distance of at least 75 km from the boundary. On the flank of the rise, six consecutive measurements confirm a decrease in heat flow to a minimum of 0.77 in a distance of less than 25 km. The anomaly cannot be explained in terms of superficial effects relating to water circulation, sedimentary processes, or topography. Uniformity of heat flow in the basin and the rapid change on the rise preclude credible explanations in terms of source distributions, mantle convection, phase change, or recent tectonic movements. The anomaly can be explained in terms of relatively low-conductivity rock extending to a depth of 10 or 20 km, either locally under the low heat-flow zone or generally under the entire rise. In the latter case, a projection would extend 50 or more kilometers under the adjacent basin at depth. In either case, low heat flow would occur only at the periphery of the rise. It is unlikely that conductivity contrasts in the crust and upper mantle would ever cause an appreciable surface heat-flow anomaly whose width exceeds 100 km. This is less than the spacing of most heat-flow stations, which therefore yield little information on the subject. Empirical formulas based on water content underestimate sediment conductivity by 10 to 20% on the rise and 5 to 10% in the basin. (Author)

AD-631 686 Fld. 8/10, 8/7
WOODS HOLE OCEANOGRAPHIC INSTITUTION MASS
MANGANESE PAVEMENTS ON THE BLAKE PLATEAU,
by Richard M. Pratt, and Peter F. McFarlin. Apr 66, 8p. Rept. no. WHOI-Ref-66-14,
Contract Nonr-2196 (00), Proj. NR-083-004,
Unclassified report

Availability: Published in Science v151 n3714 p1080-2 Mar 4, 1966. Copies to DDC users only.

Descriptors: (*Manganese, Atlantic Ocean), (*Economic geology, Atlantic Ocean), Phosphates, Sedimentation, Sedimentary rock, Ocean bottom topography, Geochemistry, Petrology, Marine geology, Gulf Stream, Chemical precipitation

Dredge samples and photographs from the Blake Plateau, off the southeast coast of the United States, indicate that a layer of manganese oxide forms pavement that may be continuous over an area of about 5000 square kilometers. The manganese pavement grades into round manganese nodules to the south and east and into phosphate nodules to the west. The Gulf Stream probably maintains a very unusual environment that prohibits deposition of clastic sediment and permits accretion of manganese pavements. (Author)

AD-631 687 Fld. 8/10, 4/2
WOODS HOLE OCEANOGRAPHIC INSTITUTION MASS
SOME CURRENT MEASUREMENTS IN THE SARGASSO SEA,
by C. Godfrey Day, and Ferris Webster. Mar 66, 15p. Rept. no. WHOI-Ref-66-9,
Contract Nonr-2196 (00), Proj. NR-083-004,
Unclassified report

Availability: Published in Deep-Sea Research, v12 p805-14 1965. Copies to DDC users only.

Descriptors: (*Ocean currents, Measurement), Atlantic Ocean, Bermuda, Buoys, Flowmeters, Oceanographic data, Marine meteorology

Long-term current measurements at depths of 50 and 100 m obtained with Richardson current meters at two deep-water moorings south of Bermuda are reported. The records are dominated by anticyclonic rotations which appear and degenerate, possibly in response to the passage of storms. Spectral analysis of the records indicates that this motion has a period of 24 hours at a depth of 50 m, and 25 X 3 hours at a depth of 100 m. No explanation

is given to account for this difference in period over a 50-m separation. Both records indicate the existence of semidiurnal tidal motion. The long-term motions at both depths indicate a systematic change in the net direction of flow over a three-month period. (Author)

AD-631 720 Fld. 8/10, 15/1
CFSTI Prices:MF $1.25
NAVAL OCEANOGRAPHIC OFFICE WASHINGTON D C
OCEAN THERMAL STRUCTURE FORECASTING.
First ed.,
by Richard W. James. 1966, 227p. Rept. no. ASWEPS MANUAL VOL. 5,
Unclassified report

Availability: U. S. Oceanographic Office, also by the Superintendent of Documents, GPO, Washington, D. C., 20402, $1.50 as D203.22/3:105.

Descriptors: (*Oceans, Thermal properties), (*Oceanology, Instruction manuals), (*Antisubmarine warfare, Oceanology), Marine meteorology, Marine geophysics, Thermodynamics, Mathematical prediction, Graphics, Nomographs

In conjunction with the development of an Antisubmarine Warfare Environmental Prediction Service (ASWEPS), a series of manuals has been prepared describing the various phases of the program from the initial observation of the environment to the final application of an oceanographic forecast to Antisubmarine Warfare (ASW) operations. This manual describes procedures for manually predicting the thermal structure of the ocean with emphasis on forecasting for a small area over a limited time period. Although procedures described are generally applicable to any ocean, emphasis is on the prediction of the thermal structure in the western North Atlantic Ocean (ASWEPS area). Forecasting procedures for a number of individual processes are described, and then the results are combined into a step-by-step procedure for computing changes to the thermal structure. All computational steps herein are presented by graphs and nomograms in order to reduce the time required to make a forecast. Examples are given of how to use the various graphs and tables required for an individual process, and sample forecasts are made combining all the procedures described. Where available, actual observations are used to verify the individual procedures. (Author)

AD-631 745 Fld. 8/10, 8/5
CFSTI Prices: HC $4.60 MF $0.50
ARMY ORDNANCE MISSILE COMMAND REDSTONE ARSENAL ALA
GEOPHYSICAL PROFILES IN THE NORTHEASTERN ATLANTIC OCEAN AND THE MEDITERRANEAN SEA 1962-1963,
by D. E. Frankowski. 1966, 49p. Rept. no. Informal H-2-66,
Unclassified report

Descriptors: (*Atlantic Ocean, Geodesics), (*Mediterranean Sea, Geodesics), (*Geodesics, Marine geophysics), Terrestrial magnetism, Gravity, Ocean bottom topography, Hydrographic surveying, Navigation, Data processing systems, Oceanographic data, Graphics

Magnetic, gravity, and bathymetric data collected on an opportunity basis aboard three ships along a total of 4450 miles of track in the Northeastern Atlantic Ocean and the Mediterranean Sea are presented in profile form. Descriptions of the survey operations, control, instrumentation, and data processing provide information for further evaluation and analyses. (Author)

AD-631 746 Fld. 8/10, 8/14, 8/5
CFSTI Prices: HC $3.60 MF $0.50
NAVAL OCEANOGRAPHIC OFFICE WASHINGTON D C HYDROGRAPHIC SURVEYS DEPT
GEOMAGNETIC MEASUREMENTS IN THE NORTH PACIFIC OCEAN ABOARD USS REHOBOTH (AGS-50) 1961,
by R. F. Obrochta. 1966, 34p. Rept. no. Informal H-3-66,
Unclassified report

Descriptors: (*Pacific Ocean, *Terrestrial magnetism), (*Geodesics, Pacific Ocean), Marine geophysics, Hydrographic surveying, Ocean bottom topography, Aleutian Islands, Oceanographic vessels, Instrumentation

Geomagnetic and bathymetric data collected on a single track in the North Pacific Ocean between San Francisco, Adak, and Pearl Harbor aboard USS REHOBOTH (AGS-50) in 1961 are presented in profile form for correlation purposes. Data collected on a small grid survey over the Aleutian Trench are presented as separate total magnetic intensity and bathymetric contour charts. (Author)

AD-631 807 Fld. 8/10, 20/1, 7/4
CFSTI Prices: HC $2.00 MF $0.50
LITTLE (ARTHUR D) INC CAMBRIDGE MASS
SOME PROPAGATION AND PRESSURE-INDUCED STRUCTURAL CHANGES IN SEA WATER.
Technical rept.,
by R. A. Horne, and H. F. Eden. 30 Apr 66, 28p. Rept. no. TR-21,
Contract Nonr-4424 (00) Task 51-460,
Unclassified report

Descriptors: (*Sea water, Molecular association), (*Underwater sound, Absorption), Hydrostatic pressure, Electrolytes, Solutions, Dissociation, Sound transmission, Propagation

The application of hydrostatic pressure is more effective in destroying the Frank-Wen clusters in bulk liquid water and in breaking up the local water structure in the hydration atmospheres of ionic species in solution than is the application of temperature. In addition, as a consequence of electrostriction, the application of pressure increases the dissociation of weak electrolytes such as magnesium sulphate. While having relatively little effect on the velocity of sound in sea water, these processes are responsible for the absorption of acoustic energy in the sea. (Author)

AD-631 260 See Fld. 13/10

8/11. SEISMOLOGY

AD-631 285 Fld. 8/11, 17/10
CFSTI Prices: HC $3.60 MF $0.50
LINCOLN LAB MASS INST OF TECH LEXINGTON
CAPABILITIES OF THE EXPERIMENTAL LARGE APERTURE SEISMIC ARRAY.
Interim rept. and Technical note,
by H. W. Briscoe, J. Capon, P. L. Fleck,Jr., P. E. Green,Jr., and R. J. Greenfield. 24 Feb 66, 40p. Rept. no. TN-1966-16,
Contract AF 19 (628)-5167 ,ARPA Order-512
ESD TDR-66-47
Unclassified report

Descriptors: (*Seismology, Data processing systems), (*Detection, Seismology), (*Seismological stations, Montana), Seismometers, Site selection, Configuration, Underground explosions, Nuclear explosions, Earthquakes, Seismic waves, Identification systems, Magnetic recording systems, Digital computers

This report presents an interim appraisal of capabilities of a single Large Aperture Seismic Array system to perform the following functions: (i) preprocess arriving seismic signals to increase their detectability, (ii) use such preprocessed signals to perform on-line automatic detection and location, (iii) process recordings of LASA data off-line, and (iv) use the results of the off-line processing for studies of seismic source type. (Author)

AD-631 340 Fld. 8/11, 17/10, 18/3
CFSTI Prices: HC $2.00 MF $0.50
TELEDYNE INDUSTRIES INC ALEXANDRIA VA EARTH SCIENCES DIV
LONG RANGE SEISMIC MEASUREMENTS. PALANQUIN.
Scientific rept. (Seismic data lab. rept.),
by Don M. Clark. 18 Apr 66, 29p. Rept. no. SDL-144,
Contract AF 33 (657)-15919,ARPA Order-624
Proj. T/6702,
Unclassified report

Descriptors: (*Seismology, *Nuclear explosions), (*Detection, Seismology), Nevada, Underground explosions, Earthquakes, Seismic waves, Identification systems, Seismological stations, Instrumentation

An analysis of seismological data from an underground nuclear explosion as a continuing study to provide information to aid in distinguishing between earthquakes and explosions. A table of travel-times and amplitudes of P, Pg, Lg, and surface waves are included along with other unidentified phases. (Author)

AD-631 437 Fld. 8/11, 8/7
CFSTI Prices: HC $2.00 MF $0.50
GEOLOGICAL SURVEY DENVER COLO
A PRELIMINARY SUMMARY OF A SEISMIC-REFRACTION SURVEY IN THE VICINITY OF THE CUMBERLAND PLATEAU OBSERVATORY, TENNESSEE.
Technical letter,
by Roger D. Borcherdt, and John C. Roller. 21 Feb 66, 34p. Rept. no. Crustal studies-43,
Contract ARPA Order-193-65,
Unclassified report

Descriptors: (*Seismology, Tennessee), (*Geophysical prospecting, *Seismic waves), Structural geology, Lithosphere, Mechanical waves, Propagation, Refraction, Underground explosions

A seismic-refraction survey was conducted in the vicinity of the Cumberland Plateau Observatory, Tennessee, (C.P.O.) in June and July 1965, to determine the velocities of seismic waves in the crust and upper mantle and the crustal structure. A total of 1300 km of reversed seismic -refraction coverage was obtained along two profiles which intersect at the observatory. Each profile is approximately 400 km in length. The velocity of seismic waves is 6.1 km/sec (P sub g) in the upper crustal layer, 6.7 km/sec (P*) in the intermediate layer, and 8.0 km/sec (P sub n) or slightly higher in the upper mantle. The depth to the intermediate layer varies from 6.3 km to 14.5 km. The Mohorovicic discontinuity dips toward the south from depths of 35 km in southern Kentucky near Fort Campbell, and Burnside, to depths of 45 km near Gainesville, Georgia, and 51 km near Moulton, Alabama. The preferred crustal model at C.P.O. is: H sub 1 = 12 km, (V sub 1 = 6.1 km/sec) H sub 2 = 28 km (V sub 2 = 6.7 km/sec) for a total crustal thickness of 40 km, with an upper-mantle velocity of 8.0+ km/sec. (Author)

AD-631 618 Fld. 8/11
CALIFORNIA INST OF TECH PASADENA SEISMOLOGICAL LAB
REGIONAL SEISMICITY AND SEISMIC WAVE PROPAGATION FROM RECORDS AT THE TONTO FOREST SEISMOLOGICAL OBSERVATORY, PAYSON, ARIZONA,
by S. J. Duda. 10 Aug 65, 37p. Contract AF 49 (638)-1337,
Unclassified report

Prepared in cooperation with Uppsala Univ. (Sweden), contract AF 61 (052)-588.

Availability: Published in Annali di Geofisica v18 n4 p365-97 1965. Copies to DDC users only.

Descriptors: (*Seismic waves, Propagation), (*Earthquakes, Seismic waves), Seismology, Seismological stations, Arizona, California, Geophysics, Instrumentation

The records of the Tonto Forest Seismological Observatory near Payson, Arizona, were used to investigate the applicability of an array station for the study of local seismicity and seismic wave propagation at short epicentral distances. Inferences are drawn about the seismicity of Arizona and the characteristics are given for two earthquake sequences, in Imperial County, California, and in Baja California. The records of the earthquakes and a selection of quarry blasts are used for the study of the propagation of crustal waves. According to their group velocities and appearance, the Sg and P-waves observed at small epicentral distances are identical with the Lg2 and pig-wave respectively, observed at larger epicentral distances. The ratio of S to P wave energy is estimated to be of the order of 100:1 for earthquakes at an epicentral distance of about 14 km. The attenuation of Sq-wave energy has a discontinuity at an epicentral distance of 325 km and possibly another at 100 km. Because of this fact an appreciable difference of seismic energies recorded at two epicentral distances, slightly below and above these critical distances, will be observed. The duration of the Sg-phase depends mainly on the magnitude of the earthquakes. (Author)

8/12. SNOW, ICE, AND PERMAFROST

AD-631 235 Fld. 8/12, 20/1
CFSTI Prices: HC $1.10 MF $0.50
DIRECTORATE OF SCIENTIFIC INFORMATION SERVICES OTTAWA (ONTARIO)
THE SQUEAK OF SNOW,
by V. A. Arabadzi, and K. I. Rudik. Jan 66, 3p. Rept. no. T-447-R
Unclassified report

Translated from Priroda (USSR) n10 p106-7 1963, by E. R. Hope.

Descriptors: (*Snow, Acoustic properties), (*Acoustics, Snow), Atmospheric temperature, Noise, Compressive properties, Correlation techniques, USSR

The acoustic spectrum of snow is analyzed to determine the relationship between the squeak of snow underfoot and the temperature of the atmosphere.

AD-631 236 Fld. 8/12, 20/2
CFSTI Prices: HC $1.10 MF $0.50
DIRECTORATE OF SCIENTIFIC INFORMATION SERVICES OTTAWA (ONTARIO)
STRUCTURE OF SEA ICE OF GREAT THICKNESS,
by N. V. Cherepanov. Jan 66, 10p. Rept. no. T-448-R, TT 66-61043
Unclassified report

Trans. of Arkticheskii i Antarkticheskii Nauchnolssledovatelskii Institut. Trudy (USSR) v267 p13-8 1964.

Descriptors: (*Ice islands, Arctic regions), (*Sea water, Ice islands), Crystallography, Petrography, Stratigraphy, USSR

AD-631 237 Fld. 8/12, 20/2
CFSTI Prices: HC $1.10 MF $0.50
DIRECTORATE OF SCIENTIFIC INFORMATION SERVICES OTTAWA (ONTARIO)
STRUCTURE OF RIVER ICE,
by P. S. Vadilo. Jan 66, 4p. Rept. no. T-449-R
Unclassified report

Translated from Priroda (USSR) n3 p52-53 1951, by E. R. Hope.

Descriptors: (*Ice, *Rivers), Crystallography, Phase studies, USSR

AD-631 685 Fld. 8/12
CFSTI Prices: HC $2.60 MF $0.50
COLD REGIONS RESEARCH AND ENGINEERING LAB HANOVER N H
SOME PHYSICAL AND MECHANICAL PROPERTIES OF POLAR SNOW.
Research rept.,
by Rene O. Ramseier. Feb 66, 29p. Rept. no. RR-116,
Task IV-014501B52A02,
Unclassified report

Descriptors: (*Snow, Mechanical properties), Anisotropy, Air, Permeability, Viscoelasticity, Creep, Compressive properties, Antarctic regions

Specimens of snow from the South Pole were tested to investigate air permeability, ultimate compressive strength and dynamic Young's modulus as a function of density. Anisotropy in a single layer of snow (snow between two summer crusts) was found in all three properties. Comparison with data for snow from Site II, Greenland, showed an empirical relation for both areas. Air permeabilities are different at the two sites because of time and meteorological effects. (Author)

AD-631 717 Fld. 8/12
CFSTI Prices: HC $2.60 MF $0.50
COLD REGIONS RESEARCH AND ENGINEERING LAB HANOVER N H
STRENGTH STUDIES OF SNOW.
Research rept.,
by Malcolm Mellor, and James H. Smith. Jan 66, 28p. Rept. no. RR-168,
Proj. DA-1V025001A130,
Unclassified report

Descriptors: (*Snow, Compressive properties), Ice, Soils, Freezing, Physical properties, Atmospheric temperature, Correlation techniques

Strength measurements were made on some 650 samples of homogeneous snow prepared under controlled conditions, primarily to investigate the effect of temperature variation. Comparative measurements were made on ice and frozen sand, and the variation of ram hardness with temperature was examined. The results are discussed in terms of surface chemistry effects at crystal boundaries. The inadequacy of density measurements for describing grain structure is discussed.

AD-631 718 Fld. 8/12, 4/2
CFSTI Prices: HC $2.60 MF $0.50
COLD REGIONS RESEARCH AND ENGINEERING LAB HANOVER N H
SNOW STUDIES IN ANTARCTICA.
Research rept.,
by A. J. Gow. Nov 65, 27p. Rept. no. RR-177,
Task DA-1V014501B52A02,
Unclassified report

Descriptors: (*Snow, *Antarctic regions), Distribution, Stratigraphy, Ice, Crystal growth, Meteorological parameters, Atmospheric precipitation

The seasonal distribution of snow at the South Pole and its relationship to stratigraphy was investigated in pits dug beside a number of 4 year old accumulation stakes. Results show that conventional stratigraphic methods yield thoroughly reliable values of accumulation rates. Even hiatuses in accumulation can be idenfified from the intensity of sublimation of layers of depth hoar. Such hiatuses can be attributed generally to the prolonged absence of accumulation rather than to widespread scouring of pre-existing layers of snow. The bulk of the year's accumulation is deposited as dunes during winter. Most dunes are subsequently transformed into linear sastrugi so that by winter's end the amplitude of the surface relief frequently exceeds the thickness of snow accumulated annually. During the summer, however, these dunes and sastrugi are gradually worn down by a process of sublimation - deflation. This leveling of the surface relief is believed to be the significant factor in the formation of the remarkably uniform stratigraphy observed in pits at the South Pole. An examination of bullet crystals in precipitation at the South Pole indicates that combinations of bullets originate as primary growth structures and that individual bullets are formed as a result of the disintegration of these primary growth forms rather than by independent crystallization of pyramidally terminated columns. Three years' measurements of snow accumulation on undulating surfaces around Byrd Station, Antarctica, indicate that the undulations are tending to be filled in. These results are discussed in the light of current knowledge of the origin and migration of such features. (Author)

AD-631 719 Fld. 8/12
CFSTI Prices: HC $2.60 MF $0.50
COLD REGIONS RESEARCH AND ENGINEERING LAB HANOVER N H
SELF-DIFFUSION IN ICE SINGLE CRYSTALS.
Research rept.,
by K. Itagaki. Mar 66, 22p. Rept. no. RR-178,
Task DA-1V014501B52A02,
Unclassified report

Descriptors: (*Ice, *Diffusion), Single crystals, Anisotropy, Crystal structure, Thermal properties, Transport properties, Crystallography

Measurements of the diffusion constants in single crystals of ice in directions parallel and perpendicular to the c-axis are described. The anisotropy of activation energy was obtained. The higher activation energy perpendicular to the c-axis indicates the free interstitial molecular jump mechanism for diffusion in ice. (Author)

AD-631 322 **See Fld. 13/2**

AD-631 503 **See Fld. 4/2**

8/13. SOIL MECHANICS

AD-631 560 Fld. 8/13, 13/3, 13/2
CFSTI Prices: HC $3.00 MF $0.75
SOUTHWEST RESEARCH INST SAN ANTONIO TEX DEPT OF AUTOMOTIVE RESEARCH
A FEASIBILITY STUDY OF MASS MOVEMENT, DISAGGREGATION, AND STABILIZATION OF SOIL.
Final technical rept.,
by A. R. Nye, and John M. Clark Jr.. 24 Apr 64, 66p. Rept. no. SwRI-AR-531,
Contract DA-22-079-eng-381, Proj. DA-1-T-0-21701-A-046,
AEWES CR-3-138
Unclassified report

Descriptors: (*Soil mechanics, *Earth-handling equipment), Soils, Material separation, Fragmentation, Stabilization, Explosive materials, Fuels, Liquids, Sulfur, Army research, Trafficability, Feasibility studies

Soils which are marginal or too weak for trafficability of conventional military construction equipment were of primary interest. Included in this category are soils which exhibit very high cohesive or 'sticky' characteristics, at least within certain moisture content ranges, making them extremely difficult if not impossible to handle by conventional methods. The disaggregation of these cohesive soils by some explosive means is explored. Rather than use a mono-propellant, and introduce a log-

istics problem, it was proposed that hydrocarbon fuels be employed by combining them with compressed air to create the explosive pressures necessary to disaggregate the soil. By employing compressed air it is not necessary to transport the weight of the oxidizer as in the case of a monopropellant. Transporting large masses of soil, after displacement and disaggregation from its natural state, is often difficult if not impossible using conventional equipment, particularly in high cohesive soils when the moisture content level is between the plastic and liquid limit. One feasible means proposed of accomplishing both rapid transit and heating of the soil was to use the exhaust gases from an aircraft jet engine to convey the soil in a high velocity gas stream conducted through pipes or ducts. It was proposed that this means of soil transport also be evaluated. Finally, the disaggregated soil should be stabilized whether it is to be transported (by exhaust gases) or not. It was proposed that an investigation be conducted into the feasibility of using liquid sulphur as one means of accomplishing this stabilization.

AD-631 369 See Fld. 13/13

8/14. TERRESTRIAL MAGNETISM

AD-631 338 See Fld. 8/7

AD-631 345 See Fld. 4/1

AD-631 510 See Fld. 4

AD-631 746 See Fld. 8/10

Field 9-ELECTRONICS AND ELECTRICAL ENGINEERING

9/1. COMPONENTS

AD-631 224 Fld. 9/1, 13/1
CFSTI Prices: HC $1.00 MF $0.50
REDSTONE SCIENTIFIC INFORMATION CENTER REDSTONE ARSENAL ALA
SEMICONDUCTOR THERMOELECTRIC TRANSISTOR COOLERS,
by V. K. Garachuk, and V. S. Nayer. 24 Feb 66, 11p. Rept. no. RSIC-523, TT 66-61044

Unclassified report

Trans. of Priborostroenie (USSR) v1 n8 p176-81 1965.

Descriptors: (*Semiconductor devices, Cooling), (*Thermoelectricity, Cooling), (*Transistors, Cooling), Germanium, Thermal conductivity, Electrical conductance, USSR

The design and the result of investigations of semiconductor thermoelectric transistor coolers that operate at high temperatures of the medium are discussed. The thermal energy liberated in powerful germanium transistors operating at temperatures of the surrounding medium of 20 to 40C is scattered, as a rule, by means of radiators in conditions of forced or natural convection. At 55 to 60C, such a method of removing heat becomes inefficient because of the low maximum permissible temperature of the p-n junction of the transistor. In these cases, it is necessary to use different methods of cooling. Semiconductor thermoelectric coolers are very promising for cooling radio-electronic apparatus, as they are distinguished by the absence of moving parts or special cooling agents, noiselessness, simplicity of design and operation, convenient and flexible regulation, and easy transition from a cooling regime to a heating regime. (Author)

AD-631 244 Fld. 9/1
CFSTI Prices: HC $18.20 MF $1.00
CARNEGIE INST OF TECH PITTSBURGH PA DEPT OF ELECTRICAL ENGINEERING
AN INVESTIGATION OF CHARACTERISTICS AND APPLICATIONS OF TUNNEL AND BACKWARD DIODES,
by William N. Carr. Oct 62, 186p. Contract Nonr-760 (09)

Unclassified report

Descriptors: (*Diodes (Semiconductor), Physical properties), (*Tunnel diodes, Physical properties), (*Semiconductor devices, Physical properties), Germanium, Resistors, Circuits, Digital systems, Switching circuits, Atomic energy levels, Degradation, Gallium compounds, Arsenides, Gallium alloys, Antimony alloys, Intermetallic compounds, Arsenic alloys

The analyses and measurements are primarily concerned with (1) the energy band structure of degenerate semiconductors deduced from junction characteristics, and (2) the use of the tunnel and backward diode in circuit control elements. The energy band structure of germanium, gallium arsenide, and gallium antimonide semiconducting degenerate material was studied primarily at low temperatures through measurements of tunnel and backward diode characteristics. A simplification based upon the calculations of Price, Radcliffe (IBM J. of Rev. and Dev. 3:364-371 (1959)) and Kane (J. Appl. Phys. 32:83-91 (1961)) was found to provide the most accurate fit to the current-voltage characteristics of the diodes observed. Potentially useful tunnel diode-resistor networks for control and transducer applications are considered. A detailed analysis has been made for the network consisting of two matched tunnel diodes and a fixed resistor. This network (termed the bias-controlled -tunnel-pair) appears useful as a basic element for performing peak threshold summation logic with over 30 db. isolation per stage. (Author)

AD-631 266 Fld. 9/1, 18/8
CFSTI Prices: HC $3.60 MF $0.50
MARTIN CO BALTIMORE MD
RADIATION EFFECTS ON INSULATED GATE FIELD EFFECT (MOS) INTEGRATED CIRCUITS.
Quarterly technical progress rept. no. 2, 1 Oct-31 Dec 65,
by David M. Long, and C. Y. Wrigley. Apr 66, 39p. Contract DA-28-043-AMC-01520 (E), Proj. 5900-21-830-44-00, ECOM 01520-2

Unclassified report

Prepared in cooperation with Sprague Electric Co., North Adams, Mass. See also AD-630 344.

Descriptors: (*Integrated circuits, *Radiation damage), Metals, Oxides, Semiconductors, Transistors, Solid state physics, Theory, Ionization, Surface properties, Voltage, Electrons, Electric fields

A shielded exposure box was constructed to reduce charge scattering and leakage currents in the flash x-ray instrumentation circuitry. The box reduced the response of the instrumentation circuitry by about an order of magnitude to levels less than 10 microamps. The theoretical analysis involved the investigation of damage mechanisms for the threshold voltage of MOS devices. Order-of-magnitude estimates and qualitative arguments are used to consider the effects of ionization, atomic displacements, and charge scattering. The primary damage mechanism is tentatively identified as the sweeping out of ionization-induced electrons from the oxide by electric fields in the oxide. The construction of p-enhancement and n-depletion devices is discussed, as are the techniques for accomplishing controlled variations of manufacturing parameters on selected devices.

AD-631 298 Fld. 9/1, 20/3, 20/12
CFSTI Prices: HC $11.60 MF $0.75
CARNEGIE INST OF TECH PITTSBURGH PA DEPT OF ELECTRICAL ENGINEERING
THE DRIFT PHOTODIODE,
by Angel G. Jordan. Jun 59, 115p. Contract Nonr-760 (09)

Unclassified report

Descriptors: (*Photoelectric cells (Semiconductor), *Diodes (Semiconductor)), (*Semiconductors, Photoelectric effect), Photoconductivity, Solid state physics, Theory, Experimental design

This dissertation presents the analysis of a very narrow, graded base photodiode. The effect of the built-in field in the graded base upon the dark and photocurrents, the relative spectral response, the transient and frequency response are analyzed. The performance of the 'drift photodiode' is compared to that of an homogeneous base one. The results are shown to be of interest for the design of practical units. (Author)

AD-631 330 Fld. 9/1, 13/8
CFSTI Prices: HC $2.00 MF $0.50
GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND DEVELOPMENT CENTER
PHOTOMETALLIC PROCESS INVESTIGATION.
Interim development rept. no. 1, 1 Dec 65-28 Feb 66,
by Donald L. Schaefer. 16 Mar 66, 47p. Contract NObsr-95045,

Unclassified report

Descriptors: (*Miniaturization (Electronics), Manufacturing methods), Photosensitivity, Etching, Gold, Aluminum, Halogen compounds, Sulfides, Cyanides, Succinimides, Nickel alloys, Chromium alloys, Methane, Iodine compounds, Iron compounds, Chlorides, Photochemistry, Silicon compounds, Dioxides

The project has as its ultimate objective the fabrication of microminiature circuits in gold, nichrome, aluminum and silica by a process in which these materials are etched directly by a photosensitive material according to an incident light pattern. Potential light sensitive halogens, sulfides and cyanides have been evaluated in liquid solvents. The capability of such materials as photoetchants has been demonstrated. Such materials as iodoform, N-bromosuccinimide, N,N' dibromodimethylhydantoin, N-chlorosuccinimide, ferric chloride and potassium ferrocyanide show the most promise. Thirty-seven compounds were investigated. Nineteen of these were positive etchants for gold. Eight were positive etchants for nichrome. (Author)

AD-631 364 Fld. 9/1, 13/8
CFSTI Prices: HC $3.00 MF $0.75
GENERAL ELECTRIC CO AUBURN N Y SEMICONDUCTOR PRODUCTS DEPT
A PRODUCT ENGINEERING MEASURE FOR THE IMPROVEMENT OF PRODUCTION TECHNIQUES TO INCREASE THE RELIABILITY AND TO IMPROVE PRODUCT CAPABILITY OF HIGH VOLTAGE MINIATURE SILICON RECTIFIERS.
Quarterly progress rept. no. 4, 30 Sep-30 Dec 65, by W. R. Comstock, P. C. Whitman, R. R. Schall, and E. G. Tefft. 30 Dec 65, 69p. Contract DA-36-039-AMC-06157 (E)

Unclassified report

See also AD-624 858.

Descriptors: (*Rectifiers, Manufacturing methods), (*Silicon, Rectifiers), (*Diodes (Semiconductor), Silicon), Reliability (Electronics), Miniature electronic equipment, Voltage, Pellets, Doping, Glass, Casting, Encapsulation, Life expectancy, Specifications

The work performed includes: evaluation of pellet design experiments performed during the last quarter; adoption of a final pellet design; installation of production equipment and start-up of the manufacturing line; completion of A13 matrix testing through the 2,000-hour readout; design of the A14 life test matrix; finalization of the proposed specification, except for reverse recovery testing; and presentation of environmental and life test data for devices fabricated during the third quarter. (Author)

AD-631 402 Fld. 9/1, 13/8
CFSTI Prices: HC $1.00 MF $0.50
MIDLAND-WRIGHT KANSAS CITY KANS
MODERATE PRECISION GLASS ENCLOSED CRYSTAL UNITS CR- (XM-44).
Quarterly progress rept. no. 11, 1 Oct-31 Dec 64, by Melvin Hammer. 31 Dec 64, 21p. Contract DA-36-039-sc-86717,
Unclassified report

See also AD-613 718.

Descriptors: (*Crystal holders, Manufacturing methods), (*Quartz resonators, Manufacturing methods), High frequency, Quartz, Encapsulation, Glass

The preproduction crystals to be fabricated from cultured quartz was delayed, because of delays encountered in obtaining cultured quartz blanks. Some tests were pre-formed to determine the angle difference between fundamental and 3rd overtone and between 3rd overtone natural quartz versus 3rd overtone cultured quartz. Crystal design sheets as used on natural quartz are being followed on the cultured quartz except for a correction on angle. (Author)

AD-631 408 Fld. 9/1
CFSTI Prices: HC $3.00 MF $0.75
RCA LABS PRINCETON N J
THIN-FILM POLYCRYSTALLINE FIELD-EFFECT TRIODE.
Quarterly rept. no. 3, 1 Jan-31 Mar 65, by P. K. Weimer, H. Borkan, J. J. Bowe, V. L. Frantz, and R. S. Hopkins. Jun 65, 56p. Contract DA-28-043-AMC-00231 (E), Proj. DA-1P622001A056,
Unclassified report

Descriptors: (*Triodes, Semiconducting films), (*Transistors, Semiconducting films), Cadmium compounds, Selenides, Sulfides, Cadmium alloys, Hall effect, Resistance (Electrical), Vapor plating, Vacuum apparatus, Manufacturing methods, Semiconductor devices, Evaporation, Selenium alloys

A process for fabricating CdSe thin-film-transistors (TFT's) reproducibly in large arrays has been developed. The deposition of the semiconductor by evaporation upon an unheated substrate is controlled by means of electrical monitoring of a sample TFT deposited on the same blank with the circuit array. Wire grill masks in the vacuum system are used to define the patterns. Integrated thin-film circuits incorporating 540 CdSe TFT's have operated continuously for more than 500 hours without failure. The Hall mobility and resistivity of vacuum -deposited CdSe films have been studied for various deposition conditions. Metal-insulator-semiconductor (M-I-S) structures have been used to study instability mechanisms in the TFT. A systematic program of fabrication and life-testing of CdS TFT's is being carried out. Analog and digital circuits incorporating TFT's were studied. Masks were designed and ordered for a three-input digital gate. (Author)

AD-631 409 Fld. 9/1
CFSTI Prices: HC $2.00 MF $0.50
RCA LABS PRINCETON N J
THIN-FILM POLYCRYSTALLINE FIELD-EFFECT TRIODE.
Quarterly rept. no. 4, 1 Apr-30 Jun 65, by P. K. Weimer, J. J. Bowe, W. H. Laznovsky, A. G. Sadasiv, and R. L. Schelhorn. Sep 65, 41p. Contract DA-28-043-AMC-00231 (E), Proj. DA-1P622001A056,
Unclassified report

See also AD-631 408.

Descriptors: (*Triodes, Semiconducting films), (*Transistors, Semiconducting films), Cadmium compounds, Selenides, Sulfides, Cadmium alloys, Selenium alloys, Life expectancy, Failure (Electronics), Stability, Deposition, Gates (Circuits), Pesistors, Nickel alloys, Chromium alloys

A process of stabilizing cadmium sulfide TFT's has been developed. Preliminary data based on 1000-hour shelf-life and operating-life tests indicate that the stablized TFT's do not have the reversible gate insulator-semiconductor instability. Shelf life and operating life have revealed that random I sub D instabilities have been greatly reduced. From early operating life-test comparisons, the long-term decay observed in previous TFT's has also been greatly reduced. Operating tests of units at 130C and 185C for 300-hour periods indicate the presence of a long-term decay mechanism. Integrated thin-film three-input gate circuits incorporating CdS TFT's and Nichrome resistors have been fabricated and tested. A procedure for depositing CdSe TFT's upon an unheated substrate has yielded good reproducibility, stability, and life. An unencapsulated circuit incorporating 540 CdSe TFT's was operated over 2000 hours at room temperature before any units failed. Another circuit of the same type has operated 700 hours at 85C without failure. (Author)

AD-631 426 Fld. 9/1, 20/9
CFSTI Prices: HC $2.00 MF $0.50
AMERICAN ELECTRONIC LABS INC COLMAR PA
PHASE SHIFT VARACTOR-DETECTOR DIODES.
Quarterly progress rept. no. 1, 1 Jul-30 Sep 65, by A. W. Barnhart, and F. E. McDonnell. Jan 66, 28p. Contract DA-28-043-AMC-01470 (E), Proj. DA-5A6-79191-D-902, Task 07, ECOM 01470-1
Unclassified report

Descriptors: (*Varactor diodes, Microwave amplifiers), (*Demodulators, Crystal mixers), (*Phase shift, Microwave amplifiers), (*Crystal mixers, Phase shift), Diodes (Semiconductor), Integrated circuits, Packaged circuits, Amplifiers, Experimental design, Vapor plating, Films, Epitaxial growth

In order to extend the technology of phase-shift and standing-wave amplification, present components will need to be improved. A circuit theory has been developed which reveals that the power-gain-bandwidth product is proportional to the square of the capacitance versus voltage exponent. In this respect, a unity exponent diode would have a 9.5 db advantage over a graded (1/3-law) varactor. A solution has been obtained for the linear - law varactor and techniques for its fabrication are discussed. In addition three models have been developed for a package that combines the varactor and the detector. (Author)

AD-631 450 Fld. 9/1
CFSTI Prices: HC $3.00 MF $0.75
SYRACUSE UNIV RESEARCH INST N Y
PERIODICALLY LOADED TRANSMISSION LINES.
Interim technical rept.,
by Jose Perini. Mar 66, 80p. Rept. no. EE957-6511T14,
Contract AF 30(602)-2646, Proj. AF-4506, Task 450604,
RADC TR-65-474
Unclassified report

Descriptors: (*Transmission lines, Waveguides), Antenna feeds, Impedance matching

In this report equations for the transmission parameters of a periodically loaded line are derived with no restrictions on magnitude, type or number of discontinuities and on attenuation on the line. Of interest are the input reflection coefficient and the generator to load transmission coefficient of the line when terminated by its characteristic impedance. The equations for these coefficients are readily derived from the transmission parameters. Several plots of the input reflection coefficient and transmission coefficient are presented and compared with experimental results. The agreement is very good. Among other important results, it is shown that maximum transfer of power to the load, through a periodically loaded line, does not always occur for minimum input VSWR. In fact, for the case of purely resistive shunt discontinuities, it corresponds to the maximum input VSWR and for the case of mixed discontinuities the minimum input VSWR does not correspond either to minimum or maximum power transfer. In such cases the transmission coefficient presents a peculiar behavior near its maximum having a sharp minimum near one side of the maximum which should be avoided. (Author)

AD-631 491 Fld. 9/1, 13/8
CFSTI Prices: HC $6.60 MF $0.75
PHILCO CORP LANSDALE PA
LOW COST INTEGRATED CIRCUIT TECHNIQUES.
Quarterly progress rept. no. 2, 15 Sep-14 Dec 65, by Sturger Wagner, and Mauro Walker. Apr 66, 68p. Contract DA-28-043-AMC-0142 (E), Proj. 1P622001A056,
ECOM 01424-2
Unclassified report

See also AD-628 618.

Descriptors: (*Integrated circuits, Manufacturing methods), (*Encapsulation, Integrated circuits), Glass, Evaportation, Deposition, Capacitors, Printed circuits, Vapor plating, Silicon compounds, Dioxides, Masking, Oxides, Metals, Silicon, Voltage, Capacitance, Aluminum, Etching

Both the evaporated and pyrolytic glass deposition techniques have been improved, resulting in encapsulating deposits of higher quality. The pinhole problem associated with the evaporated glass has been nearly eliminated. Also, improved adherence has been obtained with the pyrolytically deposited glass. Glass delineation was improved by using an improved fixture for evaporation through a metal mask. Some improvement was also made in the delineation of pyrolytically deposited glass. In the work on glass evaluation techniques, a method involving pressurized steam has proven to be effective in the relative evaluation of the passivating properties of glass. Also, mobile charge concentration studies were performed on both evaporated and pyrolytically deposited glass. Problems encountered in metalization include increased ohmic contact resistance and poor delineation. Some test models have been produced, although device and metal delineation problems have delayed the completion of the vehicles. The vehicles have been subjected to preliminary electrical and environmental evaluation. A plan for the testing and specification of the preliminary exploratory development models was prepared. (Author)

AD-631 522 Fld. 9/1
CFSTI Prices: HC $3.00 MF $0.50
TRW SEMICONDUCTORS INC LAWNDALE CALIF RESEARCH AND DEVELOPMENT DEPT
TRANSISTOR, VHF, SILICON, POWER TYPE EL-2N (X-9) 5W 500 MC PEM.
Quarterly rept. no. 2, 1 Aug-31 Oct 65, by R. Clarke, J. Crishal, J. Rice, P. Risinger, and W. Weisenberger. 31 Oct 65, 58p. Contract DA-36-039-AMC-06163 (E)
Unclassified report

See also AD-626 849.

Descriptors: (*Transistors, Manufacturing methods), (*Very high frequency, Transistors), Sputtering, Evaporation, Ceramic materials, Glass, Molding, Packaging, Silicon, Oxides, Beryllium compounds, Diffusion, Metal coatings

Glassification of finished units continues by the reactive diode sputtering while RF dielectric sputtering equipment is being prepared for sputtering of wafers as well as finished units. The six-leaded butterfly glassified-molded package yields the best performance with the simplest assembly. Two cell and complete four cell devices of the four emitter patterns with each of the two metallized patterns have been examined for optimum performance leading to the final design. The first engineering samples produced 5 to 6 dB of power gain with 35 to 45% efficiency at 28 V. The second engineering samples produced 5 to 6.5 dB of power gain with 50 to 55% efficiency at 28 V. From this data the final interrupted emitter device was prepared at the 10 watt level. In addition, an interdigitated device was also prepared for comparison at the 10 watt level. Preliminary results on the interdigitated device are 5 to 7.5 dB with 40 to 70% efficiency at 28 V. The final interrupted emitter device is currently being processed. (Author)

AD-631 636 Fld. 9/1, 20/12, 20/3
CFSTI Prices: HC $2.00 MF $0.50
LEHIGH UNIV BETHLEHEM PA INST OF RESEARCH
I. FREQUENCY CONVERSION BY THE VARIABLE CAPACITANCE OF P-I-N DIODES; II. THE REPRESENTATION OF MAGNETIZATION PROCESSES BY A ROTATIONAL MODEL.
Final technical rept.
1 Apr 66, 43p. Contract DA-AMC-28-043-64-G7,

Unclassified report

Descriptors: (*Diodes (Semiconductor), Frequency converters), (*Magnetism, Mathematical models), Silicon, Capacitance, Variable capacitors, Frequency dividers, Frequency multipliers, Varactor diodes, Hysteresis, Magnetic materials, Solid state physics, Permeability (Magnetic), Magnetic fields, Magnetic moments

Part I describes progress in a study of the use of the charge storage properties of the p-i-n junction diode for large signal frequency conversion. Circuits with a p-i-n diode as the active element have been constructed which can perform either frequency multiplication or division in the VHF band, and operation at frequencies up to 1 GHz appears feasible. Two theoretical studies were carried out. One was an analytical treatment of the problem of the power loss associated with charge storage in the diode, assuming the major loss mechanism to be the 'recovery time' of carriers stored in the 1-layer. The second theoretical study consisted of an analysis by digital computer of a bridge type of frequency doubling circuit. A simple charge-voltage characteristic was assumed for the diodes. Part II discusses the use of a rotational model to explain magnetization phenomena. This method of analysis is applicable to high frequency switching phenomena in magnetic materials, and is relevant to past studies of p-i-n diodes. The model yielded predictions which are in very good agreement with observed properties of magnetic materials, and it has also been found helpful in explaining complicated phenomena not readily susceptible to calculation. (Author)

AD-631 316 See Fld. 7/4

AD-631 347 See Fld. 9/5

AD-631 367 See Fld. 20/12

AD-631 489 See Fld. 13/8

AD-631 514 See Fld. 9/5

AD-631 515 See Fld. 13/8

AD-631 612 See Fld. 20/12

AD-631 742 See Fld. 6/18

AD-631 819 See Fld. 20/12

AD-631 820 See Fld. 20/12

9/2. COMPUTERS

AD-631 259 Fld. 9/2, 14/1
CFSTI Prices: HC $6.00 MF $1.25
SYSTEM DEVELOPMENT CORP SANTA MONICA CALIF
RESEARCH INTO THE MANAGEMENT OF COMPUTER PROGRAMMING: A TRANSITIONAL ANALYSIS OF COST ESTIMATION TECHNIQUES.
Technical memo.,
by G. F. Weinwurm, and H. J. Zagorski. 12 Nov 65, 197p. Rept. no. TM-2712/000/00,
Contract AF 19 (628)-5166,

Unclassified report

Descriptors: (*Programming (Computers), Management planning), Costs, Statistical analysis, Computer personnel, Programming languages, Cost effectiveness, Factor analysis, Standards

The report embodies the latest results of a continuing research effort directed toward the development of management guidelines, standards, and techniques in the field of computer programming. The report is focused upon the statistical analysis of 74 completed computer programming jobs in terms of their resource-costs and related variables, e.g., man months, computer hours. The primary results are: indices of job difficulty, job type, development environment, and job uniqueness; a 'costliness' factor that permits programming tasks to be ranked in this respect; weighted composites of the indices for estimating the cost of particular programming jobs; and scoring and confidence-band techniques for blending intuitive managerial judgments with the formal cost-estimation procedures. Supplementary findings include indications of the relative sensitivity of job cost to changes in the values for the indices, and preliminary comparisons of resource usage between programs produced in machine-oriented or procedure-oriented languages. (Author)

AD-631 269 Fld. 9/2
CFSTI Prices: HC $3.00 MF $0.75
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF ELECTRICAL ENGINEERING
DESIGN OF A LOW-COST CHARACTER GENERATOR FOR REMOTE COMPUTER DISPLAYS.
Master's thesis,
by Thomas Burrell Cheek. Feb 66, 71p. Rept. no. MAC-TR-26 (Thesis),
Contract Nonr-4102 (01)

Unclassified report

Descriptors: (*Computers, Display systems), Remote control systems, Computer storage devices, Real time, Resistors, Integrated circuits, Costs, Computer logic, Storage tubes

A requirement exists for a low-cost remote display terminal with alphanumeric and line-drawing capabilities for use with time-shared computer systems. A survey of existing devices and character generation techniques was carried out, and a design approach was chosen which takes advantage of mass-fabrication techniques. This includes using a five-by-seven dot matrix raster and a resistor array 'read-only' character memory for the 96 printable symbols of the Revised Proposed ASCII Code. Circuits designed included a dot matrix generator, and a resistor array memory with selection logic sense amplifiers, and a shift register output buffer. An experimental character generator with an eight-word memory was built, largely using integrated circuits and was found to work as desired. It is concluded that the design approach will yield a character generator that is of low enough cost to find wide use in remote computer terminals. (Author)

AD-631 396 Fld. 9/2, 5/8, 5/2, 17/2
CFSTI Prices: HC $3.00 MF $0.75
MASSACHUSETTS INST OF TECH CAMBRIDGE
INVESTIGATION OF AN ANALOG TECHNIQUE TO DECREASE PEN-TRACKING TIME IN COMPUTER DISPLAYS.
Master's thesis,
by William David Stratton. Mar 66, 74p. Rept. no. MAC-TR-25,
Contract Nonr-4102 (01), Proj. NR-048-189,

Unclassified report

Descriptors: (*Light communication systems, *Man -machine systems), (*Computers, Television display systems), (*Cathode ray tubes, Display systems), (*Information retrieval, Light communication systems), Graphics, Analog-to-digital converters, Electron optics, Real time, Data processing systems

Through the use of a CRT display and a light-sensitive pen, graphical material can be directly inserted into a computer by using the pen to control the position of the electron beam at the face of the CRT - a process called pen tracking. To reduce tracking time, an analog technique employing a four-point tracking pattern is proposed in this study, in which the amplitude response of the pen to corresponding pairs of points is used to determine the position of the pen relative to the center of the pattern. To study the method, one channel of the proposed two -channel analog tracking system was designed, constructed, and coupled to the horizontal channel of the Project MAC - ESL display console. To avoid the phosphor-decay limitation, an experimental 'beam' pen capable of detecting the electron beam rather than the phosphor luminescence was employed. The system includes a pattern generator, sample-and-hold gates, difference amplifier, envelope detector and noise filter, and a threshold-logic analog-to-digital converter. (Author)

AD-631 416 Fld. 9/2
CFSTI Prices: MF $1.00
ASSISTANT SECRETARY OF DEFENSE (COMPTROLLER) WASHINGTON D C
COBOL: INITIAL SPECIFICATIONS FOR A COMMON BUSINESS ORIENTED LANGUAGE.
Apr 60, 140p.

Unclassified report

Report to Conference on Data Systems Languages by its Short Range Task Force, January 7-8, 1960.

Availability: Hard copy available from Superintendent of Documents, GPO, Washington, D. C. 20402.

Descriptors: (*Programming languages, Specifications), Programming (Computers), Digital computers, Commerce

CONTENTS: General description of COBOL; characters and words; notation used in verb and entry formats in the report; procedure division; data division; environment division; reference format; special features.

AD-631 447 Fld. 9/2
CFSTI Prices: HC $2.00 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
ACADEMY OF SCIENCES OF THE USSR. SCIENTIFIC INFORMATION INSTITUTE. INFORMATION SYSTEMS. (SELECTED ARTICLES),
by E. D. Stotskii, V. B. Borshchev, F. Z. Rokhlin, and N. N. Rikko. 23 Mar 66, 40p. Rept. no. FTD-TT-65-1560, TT 66-61090

Unclassified report

Unedited rough draft trans. of mono. Akademiya Nauk SSSR. Institut Nauchnoi Informatsii. Informatsionnye Sistemy, Moscow, 1964 p18-22, 51-4, 168-77.

Descriptors: (*Data processing systems, USSR), (*Computers, USSR), (*Computer storage devices, *Graphics), (*Programming (Computers), Analysis), Topology, Bionics, Respiration, Mammals, Control systems, Simulation

On the number of nonoriented trees, the report presents a new upper limit for the number of topologically different trees which may be constructed from n links and also describes an abbreviated system for the coding of trees. The problems discussed are of importance in the selection of the most economical arrangement of information in the form of graphs within a computer memory. CON- CERNING A METHOD OF PROGRAM ANALYSIS, by V. B. Borshchev and F. Z. Rokhlin: The method for analysis of a computer program depends on representation of the program in the form of a graph having the following properties: (1) only one arc extends from each initial vertex and no arc enters a single initial vertex, and (2) only one arc enters each terminal vertex. CONTINUOUS CONTROL SYSTEMS AND THEIR MODELING, by N. N. Rikko: A scheme is proposed whereby the functions of the respiratory center of mammals may be modeled or simulated on a digital computer.

AD-631 497 Fld. 9/2, 17/2.1, 22/2
CFSTI Prices: HC $1.00 MF $0.50
ITT FEDERAL LABS NUTLEY N J
DATA BUFFERING TECHNIQUES STUDY.
Quarterly rept. no. 2, 1 Jan-31 Mar 66.
31 Mar 66, 18p. Rept. no. 5,
Contract DA-28-043-AMC-01471 (S)
Unclassified report

Descriptors: (*Communication satellites (Active), *Data transmission systems), Magnetic cores, Magnetic core storage, Delay circuits, Computer logic

The purpose is the performance of a study of techniques and equipment for the accomplishment of data buffering to correct data flow for varying range and range rates of satellite repeaters. The program is divided into four phases; investigation and selection phase, design and fabrication phase, test and performance phase, and engineering design phase. A design was evolved for a controlled data buffering system breadboard capable of correcting data flow for varying range and range rates of satellite repeaters. Based on the design, layouts, block diagrams, logic diagrams and printed circuit artwork were made, and components ordered. Fabrication of the breadboard is in process. A four-stage test plan has been developed.

AD-631 513 Fld. 9/2
CFSTI Prices: HC $2.00 MF $0.50
ROME AIR DEVELOPMENT CENTER GRIFFISS AFB N Y
JOB LINKAGES AND PROGRAM STRINGS.
Technical rept.,
by Edward Morenoff, and John B. McLean. Apr 66, 37p. Rept. no. RADC-TR-66-71,
Proj. AF-DI-64-31C
Unclassified report

Descriptors: (*Programming (Computers), Control systems), Computer logic, Data

A new technique for the communication of control and data between computer programs is described. This technique, called the PROGRAM STRING, provides a general way by which independent programs may be dynamically linked together during their execution to do specific jobs. Presented in this paper is a description of the basic concepts, component elements, formation process, linkage mechanism and control philosophy for the execution of PROGRAM STRINGS. An essential feature of the PROGRAM STRING concept is the introduction of BUFFER FILES between all programs to be linked. The BUFFER FILES essentially isolate the programs from each other and enable them to be operated completely asynchronously and independently of each other. The operation of the different programs is controlled by regulating the data flow between the programs at the BUFFER FILES. The automatic linking mechanism required that inputs and outputs for each program by symbolically referenced and their specifications be explicitly defined. (Author)

AD-631 535 Fld. 9/2, 5/8
AIR FORCE OFFICE OF SCIENTIFIC RESEARCH WASHINGTON D C DIRECTORATE OF INFORMATION SCIENCES
INFORMATION SCIENCES: SOME RESEARCH DIRECTIONS,
by Rowena W. Swanson. 1966, 14p. Proj. AF-9769,
AFOSR 66-0632
Unclassified report

Availability: Published in Air University Review v17 n3 p56-67 Mar-Apr 1966. Copies to DDC users only.

Descriptors: (*Computers, Scientific research), (*Data processing systems, Scientific research), (*Man-machine systems, Scientific research), (*Programming languages, Scientific research), Information retrieval, Artificial intelligence, Reports, State-of-the-art reviews

The paper briefly summarizes current research and exploratory development activities in areas concerned with document and data systems, management and command systems, man-machine systems, and programming languages. The orientation of the paper is toward exposition. The bibliography augments a section on intelligent systems and new mathematics with references to several proceedings and anthologies. Implications are drawn for future research and military applications. (Author)

AD-631 635 Fld. 9/2, 12/1
CFSTI Prices: HC $2.00 MF $0.50
ARIZONA UNIV TUCSON ENGINEERING EXPERIMENT STATION
HYBRID ANALOG-DIGITAL TECHNIQUES AND RANDOM-PROCESS STUDIES, 1964-1965,
by Granino A. Korn. 1965, 32p. Rept. no. EES-Series-5,
Contract AF-AFOSR-89-63 ,NSG-646
AFOSR 65-2313 ,NASA CR-63769
Unclassified report

Descriptors: (*Analog-to-digital converters, *Statistical processes), Data

Digital data processing necessarily involves quantization (roundoff) of input data. The statistical theory of amplitude quantization indicates that the effects of quantization on statistics are often negligible or can be approximately predicted and corrected, even with surprisingly coarse quantization. This tutorial paper reviews contributions to the theory made in England, the Netherlands, and Russia, as well as B. Widrow's original work in this country. Applications to remarkably inexpensive hybrid analog-digital averaging computers and correlators are also discussed. The theory can pay very handsome practical dividends: in many applications, 2- to 4-bit analog-to-digital converters and data-transmission channels can yield averages, mean squares, and correlation functions with 10- to 20-bit accuracy, and one-bit (polarity-coincidence) correlators are often practical. (Author)

AD-631 657 Fld. 9/2, 9/5
CFSTI Prices: HC $2.00 MF $0.50
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J
COMPUTER-AIDED ANALYSIS OF A SILICON MONOLITHIC INTEGRATED CURRENT SWITCH GATE.
Technical rept.,
by William V. Bell, Joseph E. Kernan Jr., and Paul H. Holub. Mar 66, 28p. Rept. no. ECOM-2683, Proj. DA-1LO-13901-A91A, Task 1LO-13901-A91A-0035,
Unclassified report

Descriptors: (*Switching circuits, *Computer logic), (*Integrated circuits, Computer logic), (*Gates (Circuits), Integrated circuits), Silicon, Circuits, Electrical properties, Synthesis, Programming (Computers), Digital computers, Noise, Reduction

In the d.c. design of large signal non-saturating-type logic circuits, it has been possible to develop a set of worst case defining equations which take into account all external and internal parameter variations; such as resistor, voltage tolerances and certain transistor parameters. An example of how a computer solves the problem of specifying allowable noise immunity of a current switch gate (C.S.G.) under worst case static conditions is illustrated in this report. (Author)

AD-631 692 Fld. 9/2, 5/6
CFSTI Prices: HC $5.60 MF $0.50
ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB
AN EFFICIENT RECOGNITION AND SYNTAX-ANALYSIS ALGORITHM FOR CONTEXT-FREE LANGUAGES,
by T. Kasami. Mar 66, 52p. Rept. no. R-257, Contract DA-28-043-AMC-00073 (E),NSF-GK-690 Proj. DA-20014501B31F
Unclassified report

See also AD-626 731.

Descriptors: (*Programming languages, Algorithms), (*Context free grammars, Algorithms), Syntax, Analysis, Magnetic tape, Computer logic, Computer storage devices

An efficient algorithm of recognition and syntax-analysis for the full class of context-free languages without the difficulty of exponential growth of computing time with the length n of input sequence is presented. This algorithm makes use of a fundamental algebraic property of a context-free language. It is shown in this paper that a context-free language is n cubed - recognizable in the sense of Hartmanis and Stearns by a double-tape or double-head single-tape Turing machine and it is n to the 4th power - recognizable by a single-head single-tape Turing machine. The size of memory required for recognition is proportional to n squared. If we use a random-access memory whose size is proportional to n squared, the computing time required for syntax-analysis is upper-bounded by C sub 1 n cubed + C sub 2 n squared N, where N denotes the number of non-equivalent valid derivation sequences for a given input sequence and C sub i's are constants independent of input sequences. If we use two tapes of length C sub 3 n squared and two tapes of length C sub 4 n as working memories, the computing time for syntax-analysis is upper-bounded by n cubed (C sub 5 + C sub 6 N).

AD-631 764 Fld. 9/2
CFSTI Prices: HC $6.60 MF $0.75
MASSACHUSETTS INST OF TECH CAMBRIDGE
COMIT. PROGRAMMERS' REFERENCE MANUAL. AN OUTLINE OF CONVENTIONS.
Second ed.
5 Nov 61, 68p.
Unclassified report

Prepared in cooperation by Research Lab. of Electronics and Computation Center. Mass. Inst. of Tech., Cambridge.

Descriptors: (*Programming languages, Instruction manuals), (*Programming (Computers), Instruction manuals), Computers, Data storage systems

The manual presents the conventions for writing programs in COMIT, and a description of how the computer interprets the instructions.

AD-631 782 Fld. 9/2
CFSTI Prices: HC $3.00 MF $0.75
ILLINOIS UNIV URBANA DEPT OF COMPUTER SCIENCE
GENERALIZED DECOMPOSITION OF INCOMPLETE FINITE AUTOMATA.
Doctoral thesis,
by Arthur Ta-shiang Pu. 30 Dec 65, 76p. Rept. no. 194,
Contract Nonr-1834 (27)
Unclassified report

Descriptors: (*Automata, Theory), Algorithms, Mathematical logic, Combinatorial analysis

AD-631 830 Fld. 9/2
CFSTI Prices: HC $1.00 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
BINARY TABLES FOR DIGITAL COMPUTERS,
by H. R. Stafford. May 64, 8p. Rept. no. TG-570,
Contract NOw-62-0606-c,
Unclassified report

Descriptors: (*Binary arithmetic, *Digital computers), Tables, Programming (Computers)

AD-631 324 **See Fld. 9/4**

AD-631 411 **See Fld. 5/1**

AD-631 429 **See Fld. 5/1**

AD-631 439 **See Fld. 12/1**

AD-631 505 **See Fld. 5/9**

AD-631 559 **See Fld. 9/5**

AD-631 561 **See Fld. 13/7**

AD-631 583 **See Fld. 20/5**

AD-631 592 **See Fld. 17/9**

AD-631 596 **See Fld. 20/3**

AD-631 634 **See Fld. 6/4**

AD-631 663 **See Fld. 1/4**

AD-631 712 **See Fld. 5/1**

AD-631 748 **See Fld. 5/2**

AD-631 781 **See Fld. 15/7**

AD-631 790 **See Fld. 4/2**

9/3. ELECTRONIC AND ELECTRICAL ENGINEERNG

AD-631 465 Fld. 9/3, 17/2, 5/9
CFSTI Prices: HC $3.00 MF $0.50
WESTON INSTRUMENTS INC NEWARK NJ
STUDY OF ELECTROLUMINESCENT DISPLAY TECHNIQUES AND EVALUATION OF A THIN FILM CROSS-GRID DISPLAY PANEL.
Final rept. Aug 64-Sep 65,
by T. K. Lakshmanan, and I. Munt. Dec 65, 53p.
Contract AF 33 (615)-1876, Proj. AF-6114,
Task 611410,
AMRL TR-65-166
Unclassified report

Descriptors: (*Display systems, *Electroluminescence), Films, State-of-the-art reviews, Manufacturing methods, Resolution, Brightness, Life expectancy, Simulation, Human engineering, Circuits, Computers, Training devices

A study was conducted of the state-of-the-art of electroluminescent display techniques applicable to simulation of on-board displays of future vehicles and displaying computer and/or video information for use in training devices. An evaluation was made of the various fabrication techniques to determine the one with greatest potential for producing a high resolution, bright cross-grid type panel display. A thin film cross-grid panel, 9 in. x 9 in. with 258 x 258 lines was fabricated and evaluated to determine operational characteristics and limitations. Some basic considerations were given to driving electronics to determine designs for maximum flexibility for computer generated inputs. (Author)

AD-631 546 Fld. 9/3, 17/2, 20/5, 20/12
CFSTI Prices: HC $1.00 MF $0.50
AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C
CHICOM STATE-OF-THE-ART IN ELECTRONICS AREA: COMPILATION OF ABSTRACTS.
Rept. no. 1 on ATD work assignment no. 87.
14 Jan 66, 16p. Rept. no. ATD-66-6,
TT 66-61094
Unclassified report

Based on CHICOM open-source materials pub. 1964-65. Rept. on Surveys of Chinese Communist Scientific and Technical Literature.

Descriptors: (*Electronics, China), (*Electrical engineering, China), Abstracts, State-of-the-art reviews, Masers, Semiconductor devices, Frequency modulation, Radio transmitters, Lasers, Irasers, Direction finding, Analog-to-digital converters, Atmospheric sounding, Electron tubes, Teletype systems, Telephone equipment

This compilation of abstracts is based on CHICOM open sources published 1964-1965. It is the first report in a series. The fifteen abstracts are arranged alphabetically by author. The following information is included: ammonia maser, semiconductor developments, radio transmitter, TV transmitter, calcium tungstate crystal, neodymium-containing laser, pulse laser, continuous-wave iraser, subminiature radio direction finder, miniature electron tube, pentode electron tube, tunnel diode, atmospheric propagation, antenna, short wave backscatter sounding, oscillator tube, audio-frequency carrier telegraph transmitter, teletypewriter, and carrier-wave telephone. A list of 7 Chinese journals searched in compiling the report is provided. There is no bibliography. (Author)

AD-631 570 Fld. 9/3
CFSTI Prices: HC $6.00 MF $1.25
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
ASYNCHRONOUS MACHINE WITH SOLID ROTOR,
by V. M. Kutsevalov. 27 Jan 66, 235p. Rept. no. FTD-MT-64-362,
TT 66-61097
Unclassified report

Edited machine trans. of mono. Asinkhronnaya Mashina s Massivnym Rotorom, Riga, 1962 187p.

Descriptors: (*Electric motors, Reviews), Impellers, Alternating current, Circuits, Magnetic circuits, Solids, Clutches, Operation, USSR

Contents: Equivalent circuits of asynchronous machine with solid rotor and equivalent parameters of solid rotor; Relative characteristics of an asynchronous machine with a solid rotor; Loci of currents of asynchronous machine with solid rotor; Asynchronous machine with solid rotor in regimes of asynchronous clutch and electromagnetic brake; Work of an asynchronous machine with solid rotor at connection to network through additional symmetrical resistance; Mechanical transition processes (starting /runup/, braking; reversing) of an asynchronous machine with a solid rotor; Some comparisons of characteristics and properties of asynchronous machine with solid rotor and normal asynchronous machine.

AD-631 199 **See Fld. 9/5**

AD-631 277 **See Fld. 8/5**

AD-631 347 **See Fld. 9/5**

AD-631 417 **See Fld. 20/14**

AD-631 418 **See Fld. 20/14**

AD-631 712 **See Fld. 5/1**

9/4. INFORMATION THEORY

AD-631 240 Fld. 9/4, 17/2
CFSTI Prices: HC $3.00 MF $0.75
LINCOLN LAB MASS INST OF TECH LEXINGTON
AN EXPERIMENTAL FACILITY FOR SEQUENTIAL DECODING.
Technical rept.,
by Charles W. Niessen. 13 Sep 65, 81p. Rept. no. TR-396,
Contract AF 19 (628)-5167, Proj. 649L
ESD TDR-65-442
Unclassified report

Prepared in cooperation with Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge. TR-450.

Descriptors: (*Decoding, Sequences), Information theory, Algorithms, Man-machine systems, Communication systems

This report describes the system design and implementation of a facility for the experimental study of sequential decoding that may be used at M.I.T. by graduate researchers in communications theory. Flexibility and ease of use are the primary requirements of this system. Thorough investigation of the characteristics of sequential decoding and likely problems to be studied led to a system based upon the Project MAC PDP-6 computer. A portable data-acquisition system, consisting of a digital tape recorder and analog-to-digital conversion equipment, is provided to make available to the com u' r the outputs of experimental demodulation equipment. The experimenter can decode the acquired data sequentially in accordance with an algorithm specified and easily written by him in a version of Fortran modified for this purpose. A display system is used for man-machine interaction. The system has been successfully implemented and tested, and experimental results are described. (Author)

AD-631 324 Fld. 9/4, 9/2, 17/2
CFSTI Prices: HC $9.60 MF $0.75
LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF
TRANSMISSION AND MECHANIZATION ASPECTS OF RESIDUE CODED SIGNALS.
Interim rept.,
by E. H. Gavenman, and R. A. Yocke. Feb 61, 92p. Rept. no. LMSD-895056,
Unclassified report

Descriptors: (*Coding, Numerical methods and procedures), (*Data transmission systems, Coding), (*Communication theory, Space communication systems), (*Computer logic, Coding), Signal generators, Correlators, Digital computers, Electrical engineering

The major objective of this study program is to determine if residue encoded numbers are beneficial in telecommunication systems. The transmission efficiency and possibilities of error correction using this unique numbering system are explored. Also, the techniques required for mechanization of logical and arithmetic processes that may be

required in such transmission systems utilizing residue coded numbers are investigated. The mechanization portion of this study considers logic circuits, coincident current core, and diode matrices as the possible ways to implement arithmetic and logic operations. In the logic circuit investigation, the necessary logical equations are generated from Karnaugh maps representing the desired operations. The resulting equations are subjected to a minimization procedure to ensure that minimum sums are obtained and thereby approach minimum circuit requirements. This process is carried out for both addition and multiplication operations of binary and Gray encoded residue numbers. The inquiry into circuit requirements using either coincident current cores or diode matrices employs a parallel representation of the residue coded number, and the circuit requirements are evaluated on the basis of matrix size. The results to date indicate that a logic circuit is the most efficient way to physically implement the arithmetic operations of addition, subtraction, multiplication; the division process presents problems which have yet to be solved. Also, a number may be represented more efficiently with a number of small bases than with a fewer number of large bases. (Author)

AD-631 473 Fld. 9/4, 20/3
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
ON WEIGHTED PCM.
Physical sciences research papers, (revised ed.), by I. T. Young, and J. C. Mott-Smith. 25 Jun 65, 6p. Rept. no. AFCRL-PSRP-206 ,AFCRL-66-187
Proj. AF-4610, Task 461007,
Unclassified report

Revision of manuscript submitted 2 Mar 65. See also AD-606 271, -606 597, and -608 782.

Availability: Published in IEEE Transactions on Information Theory v1T-11 n4 p596-7 Oct 1965. Copies to DDC users only.

Descriptors: (*Pulse code modulation, Noise), (*Data transmission systems, Errors), (*Communication systems, Systems engineering), Optimization, Least squares method, Pulse communication systems, Pulse modulation

Optimal energy distribution applied to a least mean square error criterion for PCM transmission is discussed. Comparisons are drawn between the optimized scheme and standard scheme for: (1) white noise channel and (2) white noise and rayleigh fading channel. It is concluded that for few bit samples only small energy savings are attained. (Author)

AD-631 615 Fld. 9/4, 12/1
CFSTI Prices: HC $4.00 MF $1.00
SYLVANIA ELECTRIC PRODUCTS INC WALTHAM MASS
INCIDENCE MATRIX APPLICATIONS.
Final rept. Apr 64-Apr 65,
by Richard Turyn. Apr 66, 126p. Contract AF 30(602)-3334, Proj. AF-4519, Task 451902, RADC TR-65-175
Unclassified report

Descriptors: (*Combinatorial analysis, Information theory), (*Communication systems, Digital systems), Synchronization (Electronics), Matrix algebra, Experimental design

This report is in two parts. The first part deals with certain finite configurations which have been applied in the design and analysis of statistical experiments. Some of their mathematical properties are examined, certain ones are described in detail and some new results, particularly on generalizations employing roots of 1 other than plus or minus 1 are reported. The applications of these configurations to the construction of various codes are discussed. The second part is a study of a hypothetical self-synchronizing coding system based on codes derivable from some of the configurations described in the first part. (Author)

AD-631 693 Fld. 9/4, 9/5, 17/2
CFSTI Prices: HC $7.60 MF $0.75
CRUFT LAB HARVARD UNIV CAMBRIDGE MASS
WAVEFORMS AND RECEIVERS FOR PULSE AMPLITUDE MODULATION.
Interim technical rept.,
by T. Berger, and D. W. Tufts. 27 Sep 65, 76p. Rept. no. Cruft-TR-488,
Contract Nonr-1866 (16), Proj. NR-372-012,
Unclassified report

Descriptors: (*Pulse amplitude modulation, *Transmitter-receivers), (*Information theory, Pulse amplitude modulation), Optimization, Pulse communication systems, Data transmission systems, Waveform generators, Signal-to-noise ratio, Phase distortion, Errors, Mathematical analysis

Intersymbol interference, additive noise and inexact synchronization, or timing jitter, are three common sources of distortion in data transmission systems. For pulse amplitude modulation communication links, the combination of transmitter waveform and linear receiver which minimizes the overall mean square error arising from these sources is determined. Formulas are derived which permit one to explore the dependence of system performance on the data rate, the correlation properties of the data, the noise spectrum, the impulse response of the transmission medium and the probability distribution of the timing jitter. Mean square error vs. signal-to -noise ratio performance characteristics of the optimal systems are determined explicitly for several examples. These characteristics are compared both with those of certain suboptimal systems and with the optimal performance theoretically attainable (OPTA) derived from Shannon's theory of rate distortion functions. The optimal PAM systems, which can be interpreted as ideal combinations of infinite memory convolution encoders and decoders, are seen to perform very close to the OPTA for low signal-to-noise ratios. For high signal-to-noise ratios, however, the mean square error of an optimal PAM system decreases as the reciprocal of the signal-to-noise ratios, whereas the OPTA generally decreases exponentially. Accordingly, there exists a potential for realizing significant improvement at high signal-to-noise ratios by resorting to complex, nonlinear coding techniques. (Author)

AD-631 712 **See Fld. 5/1**

AD-631 767 **See Fld. 20/5**

9/5. SUBSYSTEMS

AD-631 199 Fld. 9/5, 9/3
CFSTI Prices: HC $5.60 MF $0.75
LINCOLN LAB MASS INST OF TECH LEXINGTON
THE DESIGN OF BAND SEPARATION FILTERS.
Master's thesis (group rept.),
by Alfred I. Grayzel. 4 Jan 61, 59p. Rept. no. 25G-0032,
Contract AF 19 (604)-7400,
ESD TDR-66-163
Unclassified report

Descriptors: (*Band-pass filters, Experimental design), (*Networks, Band-pass filters), Transmission lines, Synthesis, Impedance matching, Frequency analyzers, Electrical engineering, Filters (Electromagnetic wave)

A band separation filter is a network with one input and m outputs, each corresponding to a different portion of the frequency spectrum. When a voltage is applied to the input terminal, it will appear at one of the output terminals only slightly attenuated. The filter considered here is a lossless network with each output terminal terminated in a one ohm resistance. The further condition that the input impedance of this network equals 1 + j0 for all frequencies is imposed. In this thesis a sufficient condition for realizability on the m transfer impedances is derived. It is shown that Butterworth characteristics for each of the m transfer impedances can be achieved with networks synthesizable in ladder form. It is also shown that L filter characteristics are also realizable but that the synthesis procedure is more complicated and necessitates coupled coils. Normalized curves of the attenuation characteristics for each type are presented. The extension of this method to transmission line networks is discussed, and it is shown that the Butterworth characteristic can be achieved with this type of element. (Author)

AD-631 270 Fld. 9/5, 17/2
CFSTI Prices: HC $3.00 MF $0.75
AMERICAN ELECTRONIC LABS INC COLMAR PA
A STUDY TO IMPROVE CRYSTAL VIDEO DETECTORS.
Interim technical rept., Jun-Dec 65,
by J. Slowek. Mar 66, 94p. Contract AF 30 (602)-3816, Proj. AF-4505, Task 450501, RADC TR-66-59
Unclassified report

Descriptors: (*Crystal detectors, Sensitivity), (*Crystal video receivers, Sensitivity), Video amplifiers, Diodes (Semiconductor), Semiconductors, Preamplifiers, Tunnel diodes, Transistors, Silicon, Germanium, Gallium compounds, Arsenides, Gallium alloys, Antimony alloys, Intermetallic compounds

Emphasis was directed at improving the sensitivity of crystal video detectors and at establishing a better understanding of the actual mechanisms involved in crystal video detection. A theoretical investigation led to the development of a series of expressions relating to detector conversion efficiency and noise behavior; these expressions permit the calculation of theoretically obtainable sensitivities. The influence of detector parasitic parameters on detector sensitivity is explained. A series of measurement techniques were developed which enable detector diode evaluation to be made in terms of conversion efficiency and noise properties. New semiconductor materials were evaluated for use as crystal video detectors. The materials evaluated include p- and n-type silicon, GaSb, GaAs, and Ge. The highest tangential sensitivities presently obtained are -63 db (m) for a 2 Mc video bandwidth and at an RF frequency of 2 Gc. Theoretically predicted sensitivity indicates that there is still an improvement of 4 db that can be made. (Author)

AD-631 288 Fld. 9/5
CFSTI Prices: HC $3.00 MF $0.75
HAMILTON STANDARD DIV UNITED AIRCRAFT CORP BROAD BROOK CONN
MICROBONDS FOR HYBRID MICROCIRCUITS.
Quarterly progress rept. no. 6, 1 May-31 Jul 65, by P. R. Amlinger, and S. L. Sherman. 6 Apr 66, 69p. Rept. no. HSER-3133,
Contract DA-36-039-AMC-03742 (E), Proj. DA-1P6-22001-A-057, Task DA-1P6-22001-A-057-03-21,
ECOM 03742-6
Unclassified report

See also AD-630 948.

Descriptors: (*Miniature electronic equipment, *Bonding), (*Circuit interconnections, Bonding), Micromineaturization (Electronics), Wire, Gold, Metal films, Chromium, Aluminum, Nickel, Reliability (Electronics), Welding, Soldering, Welds, Soldered joints, Failure (Mechanics), Aluminum compounds, Beryllium compounds, Oxides, Sapphires, Silicon

The overall objective of the program is development of reliable high yield processes for bonding

fine wires of gold and aluminum to gold-chromium and aluminum films on various substrates such as alumina, sapphire, and oxidized silicon. The reliability goal of a maximum expected failure rate of 3 bonds per 1000 at a 90% confidence level was demonstrated for type H microbonds (0.001 inch gold wire resistance welded to gold-chromium film on oxidized silicon). Preliminary bonding of riser wires to edge terminations of Ni/Au/Cr films on (as-fired) alumina (Type V microbonds) was initiated. It was found that use of gold-plated copper matrices resulted in low mean pull strength. A survey of available flap-pack lead material and multilayer circuit boards was started. Sample welds made with a parallel-gap resistance welder were investigated but no conclusions could be drawn. The investigation of flip-chip bonding, was continued on a limited basis. However, the preliminary results using a soldering technique indicated the bonds were not as reliable as desired and that other bonding techniques such as ultrasonic bonding should be investigated.

AD-631 296 Fld. 9/5
CFSTI Prices: HC $12.60 MF $0.75
CARNEGIE INST OF TECH PITTSBURGH PA DEPT OF ELECTRICAL ENGINEERING
LARGE SIGNAL ANALYSIS OF PARAMETRIC SUBHARMONIC OSCILLATOR.
Technical rept. on magnetic amplifiers,
by Abrahim Lavi. Sep 59, 126p. Rept. no. TR-28,
Contract Nonr-760 (09)
Unclassified report

Descriptors: (*Oscillators, *Signals), Magnetic amplifiers, Transients, Digital systems

An analysis is given for the second subharmonic parametric oscillator with two ferromagnetic cores which is used in binary data handling systems. 'Square Loop' techniques based on the ideal core assumption have been chosen considering subsequently the effects of hysteresis losses and saturated inductance. First, the steady state operation both with voltage and with current pump drives have been studied in order to determine the values of parameters of the circuit which give rise to the subharmonic oscillation. For this, certain general rules of logic are established which are a consequence of the magnetic idealization adopted. The transient response of the device is of primary importance for practical purposes. The switching of the output oscillations from one phase to the other is handled by the same rules of logic already established. The transient is followed half cycle by half cycle of the pump and the pertinent difference equations are derived as a guidance to the calculations. The influence of the magnitude of the initial capacitor voltage upon the transient is also illustrated. The experimental results agree with the analytical predictions for a wide range of drive frequencies. The upper limit used in the experimentation is LMC and it appears that the application of the same methods to higher frequencies is possible with satisfactory quantitative results.

AD-631 321 Fld. 9/5, 17/9
CFSTI Prices: HC $1.60 MF $0.50
RAND CORP SANTA MONICA CALIF
QUANTIZATION NOISE IN DIGITAL MTI SYSTEMS,
by L. E. Brennan, and I. S. Reed. Mar 66, 14p. Rept. no. P-3325,
Unclassified report

Descriptors: (*Analog-to-digital converters, *Noise (Radar)), Digital systems, Radar pulses, Mathematical analysis

In the past, most MTI radars have used analog signal processing. With the present capability in analog-to -digital converters, digital memories and arithmetic units, it is possible to perform this processing digitally in some systems. A trend toward digital MTI processors can be expected with future improvements in digital technology. This paper deals with the effect of quantum size, or number of bits in the analog-to-digital conversion, on quantization noise in the output of an MTI processor. The correlation between quantization errors on successive pulses is considered in the analysis. This correlation has a quieting effect in some cases, reducing the output quantization noise.

AD-631 347 Fld. 9/5, 20/12, 9/3, 9/1
CFSTI Prices: HC $3.00 MF $0.75
ELECTRONIC DEFENSE LABS SYLVANIA ELECTRONIC SYSTEMS-WEST MOUNTAIN VIEW CALIF
THE EXTENSION OF DYNAMIC RANGE AND FREQUENCY COVERAGE IN SOLID-STATE AMPLIFIERS AND MIXERS.
Technical memo.,
by David M. Hodsdon. 30 Nov 65, 94p. Rept. no. EDL-M871,
Contract DA-28-043-AMC-00379 (E)
Unclassified report

Descriptors: (*Solid state physics, Electronic equipment), (*Amplifiers, Solid state physics), (*Mixers (Electronics), Solid state physics), Very high frequency, Logarithmic amplifiers, Transistor amplifiers, Preamplifiers, Feedback, Broadband, Tuned amplifiers, Filters (Electromagnetic wave), Optimization, Experimental design

Investigations were made to increase the dynamic range and frequency coverage of solid-state VHF receivers. The following aspects are considered: (1) A theoretical and experimental comparison is made between a field-effect transistor and a conventional transistor amplifier in respect to intermodulation distortion and noise figure; (2) balanced amplifiers with feedback are considered for improving dynamic range; (3) the phase and amplitude criteria at the frequency crossover of partitioned amplifiers are investigated; and (4) experimental data are presented on a doubly balanced mixer, a logarithmic amplifier, and a voltage-tuned filter covering from 650 to 900 Mc. (Author)

AD-631 412 Fld. 9/5
CFSTI Prices: HC $4.00 MF $0.75
BENDIX RADIO DIV BENDIX CORP BALTIMORE MD
THIN FILM MICROCIRCUIT INTERCONNECTIONS.
Quarterly rept. no. 2, 1 Oct-31 Dec 65,
by Harold M. Greenhouse, Robert T. Galla, Ira G. Goldsmith, Theodore H. Yaffee, and Winfield W. Richardson. Mar 66, 103p. Contract DA-28-043-AMC-01482 (E), Proj. DA-1P6-22001-A-057, Task 03,
ECOM 01482-2
Unclassified report

See also AD-628 577.

Descriptors: (*Integrated circuits, Circuit interconnections), (*Circuit interconnections, Metal films), Microminiaturization (Electronics), Vapor plating, Chromium, Silicon compounds, Monoxides, Tantalum alloys, Aluminum alloys, Chromium alloys, Gold alloys, Adhesion, Resistance (Electrical), Aging (Materials), Non-destructive testing, Infrared photography, Electrical insulation, Test equipment

Process specifications for the deposition of chromium, silicon-monoxide and tantalum-aluminum were established. Adhesion tests of chromium-gold, chromium and aluminum thin films to glass substrates were completed. All interfacial interconnection combinations were fabricated, and D. C. measurements yielded an order-of-magnitude value for their D. C. interfacial resistance. Infrared photography was evaluated as a non-destructive test for the quality of thin film interconnections, and it was found to be not very useful. A new interfacial interconnection pattern is proposed which will make possible precise quantitative values for the interfacial resistance. Insulating crossover combinations were fabricated using silicon-monoxide as the dielectric, at various thicknesses from 2,700A to 27,000A. No correlation between capacitance and breakdown voltage was found. Asymmetrical voltage breakdown was investigated and none was found to exist. An automatic tester for breakdown voltage determination is being designed. (Author)

AD-631 478 Fld. 9/5, 17/2
CFSTI Prices: HC $3.00 MF $0.75
ROME AIR DEVELOPMENT CENTER GRIFFISS AFB N Y
TIDES: A TIME-DIVISION ELECTRONIC SWITCHING SYSTEM USING INTEGRATED CONTROL.
Technical rept.,
by Allen A Kunze. Mar 66, 82p. Rept. no. RADC-TR-65-270,
Proj. AF-DP-64-23,
Unclassified report

Descriptors: (*Integrated circuits, *Switching circuits), Military requirements, Control systems, Modules (Electronic), Digital systems, Communication systems

A military circuit switching system must have the ability to handle emergency situations in which a large percentage of its circuits are simultaneously active. In devising schemes to implement switching systems, private industry recognizes this situation to the extent of providing rapid, sophisticated common control equipment to process calls. It appears, however, that insufficient attention has been given to integrating the call processing functions with the more elementary crosspoint control functions, with the aim of creating an 'integrated switching module.' This module would stand virtually on its own, containing switching matrix, crosspoint control logic, and call processing logic. Implementation of a circuit switching system then would consist of interconnecting the requisite number of modules. This report describes the integrated switching module, and details the operation of the module and of a suggested circuit switching system containing several such modules. Included are discussions of some important system features and their impact on the basic approach, such as conference calls, hot line operation, long distance switching, saturation signalling, and other supervisory and monitoring capabilities incorporating call transfer, change of address, and trunk hunting. (Author)

AD-631 488 Fld. 9/5, 20/9, 20/14
CFSTI Prices: HC $3.00 MF $0.75
TRW SYSTEMS REDONDO BEACH CALIF
RESEARCH ON ELECTRONICALLY SCANNING ANTENNAS.
Final rept. 25 Jan 65-25 Jan 66,
by D. L. Bullock, and H. G. Oltman. Feb 66, 88p. Rept. no. 4390-6003-R0000,
Contract AF 19 (628)-5041, Proj. P4600, Task P460002,
AFCRL 66-168
Unclassified report

See also PB-167 873.

Descriptors: (*Phased arrays, *Plasma medium), Cylindrical bodies, Theory, Mathematical analysis, Microwave equipment, Antenna radiation patterns, Impedance (Electrical), Mercury, Cesium, Antenna components, Coupling circuits, Magnetic fields

The results of a one year theoretical and experimental investigation of the properties of a cylindrical plasma column used as a scanning microwave antenna are presented. A complete mathematical treatment is given for a new class of 'fast wave' modes for an open, cold plasma column in the absence of applied magnetic fields. Experimental results presented include antenna patterns, impedance measurements, and noise measurements. The results for different plasma operating parameters and microwave feed configurations are reported. Good agreement is obtained between experimental behavior of the antenna and the properties of the 'fast wave' modes. Most serious experimen-

tal problem is the production of homogeneous plasmas. (Authror)

AD-631 514 Fld. 9/5, 9/1, 19/4, 14/2
CFSTI Prices: HC $2.00 MF $0.50
BALLISTIC RESEARCH LABS ABERDEEN PROVING GROUND MD
EVALUATION OF A TUNNEL-DIODE OSCILLATOR FOR USE IN GUN PROBE TELEMETRY.
Memorandum rept.,
by James W. Evans. Nov 65, 28p. Rept. no. BRL-MR-1711,
Proj. RDT-E1V014501B53A
Unclassified report

Research supported in part by DASA, purchase order no. MIPR-634-65.

Descriptors: (*Oscillators, *Tunnel diodes), (*Telemetering transmitters, Gun launched), (*Radiosondes, Gun launched), High altitude, Hypervelocity projectiles, Ultrahigh frequency, Atmospheric sounding, Probes, Hypervelocity guns, Telemeter systems

A 1750 mc/s tunnel-diode oscillator for use as a UHF telemetry transmitter in high velocity gun launched projectiles is described. The results of performance tests under high acceleration conditions are discussed. Performance deficiencies are noted. Because of the recent developments in high frequency transistors and current availability of transistor oscillators with power outputs of 100 to 500 milliwatts at 1750 mc/s, it is not planned to continue the work on tunnel oscillators.

AD-631 559 Fld. 9/5, 9/2
CFSTI Prices: HC $3.00 MF $0.50
LINCOLN LAB MASS INST OF TECH LEXINGTON
THE HAYSTACK COMPUTER CONTROL SYSTEM.
Technical rept.,
by Frank E. Heart, Arthur A. Mathiasen, and Paul D. Smith. 27 Oct 65, 53p. Rept. no. TR-406,
Contract AF 19 (628)-5167, Proj. AF-649L,
ESD TDR-65-497
Unclassified report

Descriptors: (*Radar antennas, Steering), (*Radio telescopes, Steering), (*Space communication systems, Parabolic antennas), (*Parabolic antennas, Steering), X band, Satellite tracking systems, Radio astronomy, Data processing systems, Position finding, Man-machine systems, Programming (Computers), Digital computers, Control systems, Massachusetts

The 120-foot-diameter Haystack antenna operates at X-band and is used for satellite communications, radio astronomy, and radar astronomy. Haystack will be used to study stars, planets, the sun, the moon, and earth satellites. In order to point the antenna to within 1/10 beamwidth (22 seconds of arc) and to provide flexible control and data processing for diverse users, a digital computer has been tightly integrated into the control system. The parameters of an experiment and computer control are arranged via simple operator discourse through a keyboard/printer. The computer system can simultaneously direct the antenna, process receiver signal data, drive convenient operator displays, and permit operator discourse. Thus, processed signal data may be observed in real time, and modifications to the experiment may be rapidly implemented. The computer control system has been completed and is in full operation. (Author)

AD-631 576 Fld. 9/5, 13/1
CFSTI Prices: HC $1.10 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
CONTROL DEVICE FOR ELECTROLUMINESCENCE CELLS,
by P. A. Savisko, I. Z. Prusakov, and Yu. I. Chernyshev. 23 Mar 66, 5p. Rept. no. FTD-TT-65-1169,
TT 66-61099
Unclassified report

Unedited rough draft trans. of Russian patent 168 527, appl. no. 891389/26-24, 28 Mar 64.

Descriptors: (*Lighting equipment, Electroluminescence), (*Electroluminescence, Control systems), Transformers, Coils, Circuits, USSR, Patents

The object of the invention is a control device for an electroluminescence cell which contains an electroluminescence element joined with the secondary winding of a transformer, the primary winding of which is connected up to the output of the control device; and which has the distinguishing feature that, for the purpose of improving the dependability of the preservation of the information and the selection of the element, it is designed with a tristable inductive 'parametron' into the input circuit of which there is connected in series a coupling transformer with three control windings. (Author)

AD-631 603 Fld. 9/5, 17/2.1
CFSTI Prices: HC $4.60 MF $0.50
RADIO CORP OF AMERICA CAMDEN N J COMMUNICATIONS SYSTEMS DIV
MODULES (INTEGRATED CIRCUITS) FOR COMMUNICATIONS.
Quarterly rept. no. 3, 1 Jul-30 Sep 65,
by F. E. Farmer, A. M. Hoque, and H. Groot.
Apr 66, 45p. Contract DA-28-AMC-00454 (E),
Proj. DA-1P6-22001-A-057-03,
ECOM 00454-3
Unclassified report

See also AD-627 914.

Descriptors: (*Communication equipment, Integrated circuits), (*Intermediate frequency amplifiers, Integrated circuits), (*Transponders, Integrated circuits), (*Integrated circuits, Tests), Analog systems, Video amplifiers, Logarithmic amplifiers, Tuned amplifiers, Identification systems, Optimization, Performance (Engineering), Broadband, Delay lines

Two integrated circuits were evaluated, the Philco PA-713 and the RCA TA-5112. The final design selected for the Lin-Log 60-megacycle IF amplifier was a synchronously tuned amplifier using the successive detection and summation technique with a delay line and using the RCA TA-5112 integrated circuit in a differential configuration as the basis for the design. (Author)

AD-631 674 Fld. 9/5
CFSTI Prices: HC $2.00 MF $0.50
STATE UNIV OF NEW YORK STONY BROOK COLL OF ENGINEERING
ANALYSIS AND SYNTHESIS OF APERTURE FIELDS OF LOG PERIODIC ANTENNAS,
Technical rept.,
by Richard B. Kieburtz. 31 Aug 65, 37p. Rept. no. scientific-2,TR-51
Contract AF 19 (628)-4144, Proj. AF-4600,
Task 460004,
AFCRL 65-800
Unclassified report

See also AD-626 696.

Descriptors: (*Log periodic antennas, *Antenna feeds), Electric fields, Antenna radiation patterns, Dipole antennas, Propagation, Electrical impedance, Wave transmission, Electromagnetic waves, Analysis, Synthesis

The paper establishes the relationships between the variation of field intensity along the surface of a log-periodic (L.P) antenna and the propagation constant of its uniformly periodic prototype. The prototype is then studied to determine the effect of modifications of the structure on the aperture field of the L.P. antenna. It is proposed that the directivity of an L.P. antenna may be improved by designing it for multi-mode operation with multiple active regions from which radiation occurs. In order to evaluate the coupling of modes in the active regions of an L.P. dipole array a simple coupled mode periodic transmission line model has been employed. Between active regions the characteristic impedances of the two dominant modes are badly mismatched and little coupling occurs. In an active region the modes are strongly coupled and the resulting perturbation of the propagation constants is evaluated by coupled-mode theory. The effect of variation of several parameters of the structure to bring about desired modifications of the dispersion curve is also investigated. (Author)

AD-631 678 Fld. 9/5
CFSTI Prices: HC $2.00 MF $0.50
SYRACUSE UNIV N Y DEPT OF ELECTRICAL ENGINEERING
RESPONSE OF HIGH-Q, TUNED CIRCUITS TO STEP INPUTS IN FREQUENCY PHASE, AND AMPLITUDE.
Interim rept.,
by James G. Harris. Apr 66, 39p. Rept. no. TR-66-1,
Contract AF 30 (602)-3649, Proj. AF-4519,
Task 451902,
RADC TR-66-191
Unclassified report

Descriptors: (*Tuned circuits, Mathematical analysis), Frequency-shift-Keyers, Transients, Frequency, Phase (Electronics), Integral transforms

A mathematical analysis of the response of a high-Q tuned circuit to input steps in frequency, phase and amplitude is presented. Laplace transform techniques are used to determine the electrical performance of a generalized RLC resonant circuit and conditions necessary to eliminate transient current effects are derived. Two examples illustrate the circuit response to FSK and PSK types of transition. (Author)

AD-631 691 Fld. 9/5, 12/1
CFSTI Prices: HC $3.60 MF $0.50
ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB
GENERATION OF TREES AND COMPLETE TREES,
by Wataru Mayeda. Apr 66, 37p. Rept. no. R-284,
Contract DA-28-043-AMC-0073 (E),AF-AFOSR-931-65 Proj. DA-20014501B31F
Unclassified report

Descriptors: (*Topology, *Electrical networks), Matrix algebra, Graphics, Programming (Computers)

A method of generating all complete trees of a pair of linear graphs which can represent active networks is given. This method consists of two parts, one of which is to obtain one complete tree and the other is to generate all possible complete trees of distance one from that already determined.

AD-631 705 Fld. 9/5, 18/8
CFSTI Prices: HC $3.00 MF $0.50
HUGHES AIRCRAFT CO FULLERTON CALIF
RADIATION EFFECTS ON (MONOLITHIC) MICROELECTRONIC CIRCUITS.
Quarterly technical rept. no. 3, Nov 65-31 Jan 66,
by C. W. Perkins, R. W. Marshall, E. P. Mitchell, and A. M. Liebschutz. May 66, 56p. Rept. no. FR-66-17-57,
Contract DA-28-043-AMC-01313 (E), Proj. DA-5900.21.830.23,
ECOM 01313-3
Unclassified report

See also AD-629 948.

Descriptors: (*Microminiaturization (Electronics), Radiation damage), (*Radiation damage, *Semiconductors), (*Integrated circuits, Radiation damage), Radiation measurement systems, Reliability (Electronics), Transistors, Diodes (Semiconductor), Wiring diagrams, Gates (Circuits)

Phase I was completed during the third quarter with the circuit evaluation for permanent damage as determined in the pulsed reactor tests. The results of these tests show that the RCTL circuits are more susceptible to neutron damage than the RTL and DTL circuits. This is because the manufacturers of the RCTL circuits use triple-diffused planar techniques for the transistor structure rather than the planar epitaxial techniques employed in the RTL and DTL circuits. In addition smaller geometry and gold-doping are used in the latter. RTL and DTL circuits fail at a neutron fluence above 10 to the 14th power nvt, in general, while the RCTL circuits fail at an order of magnitude lower. (Author)

AD-631 803 Fld. 9/5
CFSTI Prices: HC $2.00 MF $0.50
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J
DESIGN, FABRICATION, AND EVALUATION OF THIN-FILM AMPLIFIERS.
Technical rept.,
by Herbert C. Frankel. Mar 66, 43p. Rept. no. ECOM-2687,
Proj. DA-1CO-24401-A-348, Task 1CO-24401-A-348-00-53,
Unclassified report

Descriptors: (*Amplifiers, Films), (*Microminiaturization (Electronics), Amplifiers), Circuits, Gain, Dielectric capacitors, Dielectric films, Resistors, Capacitors, Nickel alloys, Chromium alloys, Aluminum, Silicon compounds, Monoxides

The report describes the design, fabrication, and evaluation of two versions of a thin film hybrid amplifier. The amplifier uses a two stage, RC coupled, common emitter circuit originally designed to provide 40 db voltage gain in a 455 kc i.f. application. The thin film versions include eight nichrome resistors and five aluminum electrode-silicon monoxide dielectric capacitors. In the first thin film version, produced on a 3 in x 1 in glass slide, two of the capacitors, nominally 0.1 microfarad each, were made by multilayering electrode and dielectric films alternately. The second version, produced on both sides of a 3/4 in glass square, utilizes a single 500 A dielectric layer in each 0.1 microfarad capacitor. (Author)

AD-631 809 Fld. 9/5, 14/2
CFSTI Prices: HC $2.00 MF $0.50
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J ELECTRONIC COMPONENTS LAB
HIGH-POWER S-BAND POWER DIVIDER.
Technical rept.,
by Robert M. True. Mar 66, 27p. Proj. DA-1P6-22001-A-055, Task 04,
ECOM 2685
Unclassified report

Descriptors: (*Power dividers, S band), Radiofrequency power, Waveguides, Laboratory equipment, Standing wave ratios, Attenuation

The report describes the design, construction, evaluation, and use of a high-power, S-band, waveguide power divider. This device exhibits a power-handling capability of 500 kilowatts peak and 500 watts average, and has a dynamic range greater than 36 db. The need for such a power divider arose when it became necessary to examine the behavior of the experimental circulator at various intermediate power levels. The major design features and construction details are discussed, and evaluation of test data is presented. (Author)

AD-631 822 Fld. 9/5, 22/2
CFSTI Prices: HC $3.00 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
THERMAL BENDING OF LONG THIN-WALL BOOMS DUE TO SOLAR DIFFERENTIAL HEATING IN NEAR-EARTH ORBITS,
by James E. Phenix. Mar 64, 51p. Rept. no. TG-559,
Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Satellite antennas, *Thermal stresses), Antenna configuration, Solar radiation

Earth-orbiting radio astronomy satellites are currently receiving feasibility studies at APL/JHU. As part of these studies, thermal bending associated with solar and earth albedo heating of the proposed 1000-ft antennas has been examined. This report is intended to (1) Present the results of thermal bending analyses and experimentation. (2) Define the pertinent physical parameters affecting bending. (3) Recommend antenna configurations which will minimize thermal bending.

AD-631 197 See Fld. 6/12

AD-631 251 See Fld. 17/5

AD-631 484 See Fld. 20/14

AD-631 486 See Fld. 20/14

AD-631 537 See Fld. 12/1

AD-631 643 See Fld. 22/2

AD-631 657 See Fld. 9/2

AD-631 693 See Fld. 9/4

AD-631 713 See Fld. 22/2

AD-631 828 See Fld. 22/2

9/6. TELEMETRY

AD-631 252 Fld. 9/6
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF RADIO AND ELECTRICAL ENGINEERING
NEW TECHNIQUES USED IN TELEMETRY CAN DETECT VERY WEAK SIGNALS,
by J. K. Pulfer. 1966, 3p.
NRC 8990
Unclassified report

Availability: Published in Canadian Electronics Engineering Mar 1966. Copies to DDC users only.

Descriptors: (*Telemeter systems, *Demodulators), Signal-to-noise ratio, Frequency dividers, Phase-locked systems, Band-pass filters, Digital systems, Spectrum analyzers, Space probes, Space communication systems

Methods developed for deep space research can be used to solve many communications problems with aid of commercial instruments. The following approaches are discussed: Deviation ratio reduction techniques; phase-lock demodulation; band-dividing demodulation; digital decision method; and spectrum analyzer method.

AD-631 268 Fld. 9/6, 22/2, 4/1
CFSTI Prices: HC $2.00 MF $0.50
BALLISTIC RESEARCH LABS ABERDEEN PROVING GROUND MD
HARP, 250-MC TELEMETRY EXPERIMENTS, WALLOPS ISLAND, MARCH 1965.
Memorandum rept.,
by William H. Mermagen. Sep 65, 47p. Rept. no. BRL-MR-1694,
Proj. RDT/E-1A011001B021 ,RDT/E-1P014501A33D
Unclassified report

Descriptors: (*Telemeter systems, *Atmospheric sounding), (*Sounding rockets, Telemeter systems), Payload, Very high frequency, Probes, Tests, Performance (Engineering), High altitude, Test facilities, Virginia

Four High Altitude Research Program (HARP) telemetry firings were conducted. Two payloads contained temperature sensing instrumentation and the remaining two contained sunsensor and accelerometer instrumentation. The temperature instrumentation was designed to measure payload compartment temperatures during flight. The sunsensor and accelerometer instruments were to give flight dynamics data. All four transmitters functioned over a portion of their flight and data were obtained on all experiments except for the accelerometers. The results of measurement are presented as well as a discussion of certain difficulties experienced. (Author)

AD-631 276 Fld. 9/6, 4/1, 7/4, 22/2
CFSTI Prices: HC $2.00 MF $0.50
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
MINIATURE MASS SPECTROMETERS FOR UPPER ATMOSPHERE COMPOSITION MEASUREMENTS.
Instrumentation papers,
by A. D. Bailey, and R. S. Narcisi. Feb 66, 43p.
Rept. no. AFCRL-66-148 ,AFCRL-IP-95
Proj. AF-6687, Task 668701,
Unclassified report

Descriptors: (*Mass spectroscopy, *Atmospheric sounding), (*Upper atmosphere, Mass spectroscopy), (*Spectrum analyzers, Atmospheric sounding), Sounding rockets, Payload, Telemeter systems, Electrical engineering, Specifications, Wiring diagrams

A basic quadrupole mass spectrometer system for neutral and ionized gaseous composition measurements of the upper atmosphere is described. Emphasis is placed on the electronic circuits used with a particular miniature quadrupole rod assembly and ionizer. Circuits described include the power converter, scan waveform generator, dc and rf excitation generators, logarithmic output current amplifier, ion source filament emission regulator and signal-conditioning circuits for telemetering. A summary of performance specifications and critical design dimensions is included. (Author)

AD-631 645 Fld. 9/6, 22/2
CFSTI Prices: HC $3.60 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
SATELLITE TELEMETRY AND DATA PROCESSING,
by H. B. Riblet, and J. P. Randolph. Nov 63, 41p. Rept. no. TG-534,
Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Telemetering data, *Satellites (Artificial)), Telemeter systems, Doppler systems, Tracking, Data, Geodesics

The satellite program at the Applied Physics Laboratory, The Johns Hopkins University is briefly described with emphasis on the telemetry and data processing requirements and instrumentation. The telemetry modulation systems used in the APL satellites include FM/PM, PDM/FM/PM, PAM/FM/PM, and PCM/FM/PM. The telemetry data are processed with the aid of a digital computer to automatically produce numerical listings or graphical plots. Some of the results obtained through the processing of satellite telemetry data are presented. (This paper originally was presented at the International Telemetering Conference held from September 23 to 27, 1963, in London, England. Conference sessions were held at the headquarters of the Institute of Electrical Engineers, Savoy Place, and exhibits were shown at the New Lon-

don Hilton Hotel. The paper has been published in Volume One of the Proceedings of the Conference.) (Author)

AD-631 273 See Fld. 4/1

AD-631 790 See Fld. 4/2

Field 10-ENERGY CONVERSION (NON-PROPULSIVE)

10/2. POWER SOURCES

AD-631 368 Fld. 10/2
CFSTI Prices: HC $4.60 MF $0.50
UNION CARBIDE CORP PARMA OHIO RESEARCH LAB
THIN FUEL CELL ELECTRODES.
Quarterly progress rept. no. 3, 1 Nov 65-31 Jan 66,
by M. B. Clark, and K. V. Kordesch. Apr 66, 50p. Rept. no. 7,
Contract DA-28-043-AMC-01344 (E), Proj. DA-1C6-22001-A-053, Task 04,
ECOM 01344-3

Unclassified report

See also AD-627 606. Contract DA-36-039-AMC-02314 (E), Cont.

Descriptors: (*Fuel cells, *Electrodes), Catalysis, Performance (Engineering), Thermal properties, Humidity, Electrolytes, Polarization, Sodium compounds, Potassium compounds, Hydroxides, Carbon dioxide, Hydrogen, Air, Optimization

Thin electrodes of established structure and catalytic activity were produced in such quantity as to allow the building of fourteen 6-volt, 100-watt hydrogen-air batteries. The first six batteries were used to determine general performance parameters which served as guidelines for the life-testing program for the remaining eight batteries. The interrelationship between temperature, relative humidity and electrolyte concentration was studied. Current density polarization curves of the batteries were determined several times during the operational life of the batteries with air, and with oxygen. Tests to compare different modes of operation (intermittent versus continuous) and different electrolytes (NaOH and KOH) were started. The life-testing program includes performance checks at different temperature levels, and also a comparison between CO2-free and CO2-containing air. (Author)

AD-631 500 Fld. 10/2
CFSTI Prices: HC $2.00 MF $0.50
TEXAS INSTRUMENTS INC DALLAS
EXTENDED MOLTEN-CARBONATE FUEL CELL SYSTEM PROGRAM.
Final rept. 15 Feb-30 Nov 65,
by J. K. Truitt. Jan 66, 30p. Rept. no. TI-08-66-02,
Contract DA-44-009-AMC-54 (T), Proj. DA-8X99-25-001-42,

Unclassified report

Descriptors: (*Fuel cells, Electrical properties), Scale, Power, Operation, Construction, Fuels, Carbonates, Carbon dioxide, Hydrogen, Oxidation, Electrolytes

The purpose of this program extension was to test the scale-up characteristics a low-cost module concept and to increase power density to a level of 60 watts per square foot of cell area. Seven 36-cell modules, each having one square foot of cell area, but with some variations in cell structure, were constructed and tested. Two module configurations were used; one had six rows of six cells each in electrical series, and the other had 18 pairs of cells in series. Tests of the six-cell modules generally produced 35 to 45 watts per square foot during the first few hundred hours of operation, but occasionally the output exceeded 60 watts per square foot. Such deviations were also observed in the cells of the larger modules described in this report. Some fabrication and operational problems associated with these larger modules were effectively overcome. Modifications were made in the plenums to improve the distribution of fuel. The maximum output obtained using hydrogen in these modules was 60.8 watts. Under otherwise like conditions but using a synthetic partial oxidation fuel, 48.6 watts output was attained. (Author)

AD-631 272 See Fld. 11/2

10/3. ENERGY STORAGE

AD-631 271 Fld. 10/3
CFSTI Prices: HC $2.60 MF $0.50
SONOTONE CORP ELMSFORD N Y
STANDARD LINE-BATTERY ASSEMBLY BB-610 ( )/U NICKEL CADMIUM VENTED.
Quarterly rept. no. 1, 25 Jun-28 Oct 65,
by John Herrmann, Arthur Fitchman, and Raymond Nathe. Mar 66, 31p. Contract DA-28-043-AMC-01508 (E), Proj. DA-106-22001-A-053, Task 1C6-22001-A-053-02,
ECOM 01508-1

Unclassified report

Descriptors: (*Storage batteries, Design), Nickel, Cadmium, Glass textiles, Containers, Compressive properties

The report covers the research and development activities which have been directed towards the design of a 12-volt, vented, nickel-cadmium battery housed in a reinforced fiberglass container and capable of surviving four-foot, free fall drops. Essentially, the structural system consists of a steel inner box which clamps a bank of 10 cells to make a rigid assembly. This assembly, in turn, is hardmounted within a reinforced fiberglass outer box to cause its walls to be preloaded in tension. This preload tends to reduce the magnitude of compressive loads induced by impact. (Author)

AD-631 700 Fld. 10/3, 22/2
CFSTI Prices: HC $2.60 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
A COMPARISON OF SILVER-CADMIUM AND NICKEL -CADMIUM BATTERIES FOR USE ON SATELLITES,
by Wade E. Radford. 30 Jan 62, 29p. Rept. no. CF-29070A,
Contract NOw-62-0604-c,

Unclassified report

Descriptors: (*Alkaline cells, Spaceborne), (*Satellites (Artificial), Batteries + components), Nickel, Silver, Cadmium, Solar cells, Compatibility, Electrical properties, Thermal properties, Weight, Volume, Power

The power system used on many near earth satellites consists of a solar cell charger and a Ni-Cd battery. This combination has been used satisfactorily on satellites. A constant goal of power system designers is to decrease the weight and increase the reliability of such systems. The replacement of Ni-Cd batteries with Ag-Cd batteries is reported to decrease the weight, while maintaining the capacity, of a given power system. This paper is the result of an investigation of this possibility. Areas investigated were: (1) The capability of a solar cell Ag-Cd cell system to limit overcharge current. (2) The compatibility of solar cells and Ag-Cd cells in such a power system. (3) The relationship between temperature of the secondary cells and their end of charge and discharge voltages for Ni-Cd and Ag-Cd cells. (4) The relative weight and volume advantages in the use of Ag-Cd cells over Ni-Cd cells. (Author)

Field 11-MATERIALS

11/1. ADHESIVES AND SEALS

AD-631 326 See Fld. 13/8

11/2. CERAMICS, REFRACTORIES, AND GLASSES

AD-631 239 Fld. 11/2
CFSTI Prices: MF $0.50
ARMY ENGINEER WATERWAYS EXPERIMENT STATION VICKSBURG MISS
EFFECTS ON CONCRETE QUALITY OF FLUCTUATIONS, WITHIN SPECIFICATION LIMITS, IN COARSE AGGREGATE GRADING.
Final technical rept.,
by William O. Tynes. Mar 66, 22p. Rept. no. TR-6-717,

Unclassified report

Availability: Army Engineer Waterways Experiment Sta., Vicksburg, Miss., HC$0.50.

Descriptors: (*Concrete, Test methods), (*Composite materials, Concrete), Gravel, Ceramic materials, Mixtures, Material separation, Specifications, Civil engineerings

Six mass concrete mixtures were made in the laboratory, three containing natural fine and coarse aggregate and three containing manufactured limestone fine and coarse aggregate, all with the coarse aggregate graded to 6-in. maximum size. The coarse aggregate was separated into four size groups, which were then combined into three different gradings, the finest, coarsest, and middle gradings permitted by the Corps of Engineers Standard Guide Specifications for Concrete. Each grading was used for both the natural and limestone aggregate; in all other respects the six mixtures were identical, with the fine aggregate grading held constant. Tests were made of both the plastic concrete and hardened concrete specimens to determine the effects of the variations in coarse aggregate grading on the properties of the concrete mixtures. The data indicated that mass concrete containing either the finest or coarsest coarse aggregate grading permitted by the specification and either the natural gravel or crushed limestone is equal in quality to mass concrete containing the middle coarse aggregate grading. The strengths of the concretes made with the three gradings had slightly different values, but statistically no significant difference was found. (Author)

AD-631 272 Fld. 11/2, 11/6, 10/2
CFSTI Prices: HC $2.00 MF $0.50
AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C
MATERIALS FOR HIGH-TEMPERATURE ENERGY CONVERTERS: ANNOTATED BIBLIOGRAPHY.
Rept. no. 2 on ATD work assignment no. 79, task 22,
by Michael Slesarenko. 25 Feb 66, 40p. Rept. no. ATD-66-20,
TT 66-61048

Unclassified report

Based on Soviet open-source materials, 1961-1965. Rept. on Surveys of Soviet Scientific and Technical Literature. See also AD-625 198.

Descriptors: (*Thermionic converters, *Heat-resistant materials), (*Refractory metal alloys, Thermionic converters), Refractory metals, Solid solutions, Semiconductors, Plasma medium, USSR, Bibliographies, Abstracts

The annotated bibliography was compiled from Soviet open sources published 1960-1965; it is the second report in this series. Information not confined to the assigned subject was included because of its broad implications for study in this field. Translations and abstracts available in English are indicated where applicable. The 68 entries are arranged alphabetically by first author

only. An author index is provided at the end of the report for the convenience of the user. Pertinent information covered includes the following: solid solution, phase diagram, radioisotope thermoelectric generator, single crystal, pn junction, discharge plasma, transition metal, magnetic field, plasma device, binary nickel-base solid solution, indium antimonide, tellurides, arsenides, anodes, thermionic cathodes, tungsten-hafnium system, electron analogue of indium arsenide, niobium-doped rutile, germanium telluride valence-band structure, then semiconducting films, manganese-silicon alloys, uranium and zirconium carbides, physicochemical properties of tungsten-rhenium thermoelectrodes, refractory nitrides, manganese selenide, lanthanum and cerium sulfides, aluminum antimonide, thermionic energy coverters, thermionic diode, dilicides, binary cobalt-base solid solutions, plasma thermoelectric element, iridium effect on palladium. (Author)

AD-631 425 Fld. 11/2, 13/8
CFSTI Prices: HC $4.00 MF $1.00
CALIFORNIA UNIV BERKELEY COLL OF ENGINEERING
A FUNDAMENTAL STUDY OF THE MIXING OF PARTICULATE MATERIALS IN CERAMIC PROCESSING.
Final technical rept. Feb 64-Oct 65,
by D. W. Fuerstenau, R. Hogg, R. M. Fulrath, J. A. Pask, and D. S. Cahn. Oct 65, 142p. Contract AF 33 (615)-1140, Proj. AF-7350, Task 735001,
ASD TDR-62-732-Pt-3
Unclassified report

See also AD-439 599.

Descriptors: (*Ceramic materials, Processing), Particles, Mixtures, Diffusion, Particle size, Sintering, Spinels, Colloids, Aluminum compounds, Magnesium compounds, Oxides, Titanium compounds

The report comprises the results of research on the fundamentals of mixing particulate materials in systems of interest to ceramic processing. Two principal mechanisms of mixing were delineated, namely macromixing by which groups of particles are transported and micromixing by which individual particles diffuse across boundaries between regions rich in each component. The details of diffusional mixing in an ideal system were studied using a simple barrel mixer. Quantitative theories have been developed to describe the kinetics of this process for the mixing of both major and minor constituents. The mixing of multisized powders was investigated and a correlation found between the degree of mixedness and the bulk volume of the charge. The interaction between dissimilar particles in aqueous, wet-mixing systems was investigated and quantitative expressions were developed to define the stability of such dispersions. (Author)

AD-631 433 Fld. 11/2
CFSTI Prices: HC $1.00 MF $0.50
INSTITUTE OF MODERN LANGUAGES INC WASHINGTON D C
THE INFLUENCE OF SOME OXIDES ON THE REDUCTION OF VARIOUS TYPES OF LEAD-SILICATE GLASS IN HYDROGEN,
by I. I. Kitaiigorodsky, E. A. Fainberg, and L. A.Grechanik. Apr 66, 10p. Contract DA-44-009-AMC-1563 (T), Proj. DA-1M624201D46603,
AERDL T-1831-66 ,TT 66-61087
Unclassified report

Vliaianie Nekotorych Okislov na Vosstanovlenie v Vodorode Svin-zovo-silikatnych Stekol, trans. of Steklo i Keramika (USSR) n12 p8-10 1962.

Descriptors: (*Glass, Reduction (Chemistry)), Heat treatment, Hydrogen, Additives, Oxides, Alkaline metals, Ions, Lead compounds, Silicon compounds, Oxides, USSR

A method was developed which makes it possible to compare the reducibility of various types when they are heat-treated in a hydrogen atmosphere. A study of the effects of metal oxides on the reducibility of lead-silicate glass revealed oxides which activate and retard reduction. Consideration was also given to the effect of various alkaline metal ions on the reduction of glass with a high content of PbO.

AD-631 384 See Fld. 11/5

AD-631 467 See Fld. 1/3

AD-631 765 See Fld. 20/2

11/3. COATINGS, COLORANTS, AND FINISHES

AD-631 515 See Fld. 13/8

11/4. COMPOSITE MATERIALS

AD-631 334 Fld. 11/4, 11/9, 20/11
CFSTI Prices: HC $3.00 MF $0.75
AIR FORCE MATERIALS LAB WRIGHT-PATTERSON AFB OHIO
ELASTIC STRESS-STRAIN PROPERTIES OF FIBER REINFORCED COMPOSITE MATERIALS,
Technical rept. Aug 64-Jun 65,
by James M. Whitney, and Mitchell B. Riley. Dec 65, 72p. Rept. no. AFML-TR-65-238,
Proj. AF-7340, Task 734003,
Unclassified report

Descriptors: (*Elasticity, Composite materials), (*Composite materials, Plastics), (*Fibers, Reinforcing materials), Boron, Strain (Mechanics), Equations, Anisotropy, Epoxy plastics, Glass, Stresses, Glass textiles

Approximate equations for determining the elastic constants of a unidirectional fiber reinforced composite material from constituent material properties are derived. In particular, equations are developed for longitudinal modulus, transverse modulus, and Poisson's ratio, while an equation already available in the literature is suggested for shear modulus. Classical theory of elasticity is applied to simplified models of a composite unit cell resulting in closed form solutions. Airy stress functions are applied to the fiber and matrix with boundary conditions requiring continuity of displacements across the fiber-matrix interface (perfect bonding is assumed) and continuity of the appropriate stresses. Graphical results are shown for glass-epoxy composites and for boron-epoxy composites. For a composite with a high volume percent of reinforcement these graphs clearly indicate that even though resin properties are the predominant factor in transverse modulus, and shear modulus they can be improved by high modulus fibers such as boron. Experimental results were obtained for longitudinal modulus, transverse modulus, shear modulus and Poisson's ratio of a boron fiber reinforced composite. A general discussion of stress-strain relationships as applied to fiber reinforced composites is also presented. Considerable detail is given concerning the fabrication of the experimental samples. (Author)

AD-631 328 See Fld. 17/1

AD-631 383 See Fld. 11/5

AD-631 384 See Fld. 11/5

AD-631 467 See Fld. 1/3

11/5. FIBERS AND TEXTILES

AD-631 295 Fld. 11/5, 15/5
CFSTI Prices: HC $6.00 MF $1.25
LITTON SYSTEMS INC ST PAUL MINN APPLIED SCIENCE DIV
THERMAL-PHYSICAL PARAMETERS OF MATERIALS.
Final rept. 21 May 62-20 May 65,
by R. E. Larson, and A. R. Kydd. Jan 66, 240p.
Contract DA-19-129-QM-1998, Proj. DA-1K0-24401-A113,
ANL TR-66-3-CM ,ANL C+OM-16
Unclassified report

Descriptors: (*Protective clothing, Thermal insulation), (*Textiles, *Thermal insulation), Thermal properties, Physical properties, Heat transfer, Degradation, Interferometers, Surface temperatures, Heat transfer coefficients

Research was performed on the thermal-physical parameters of materials necessary for protection against intense thermal radiation. In the theoretical studies, a simplified model of the fabric-skin system was chosen and the heat flow equations were solved using an explicit finite difference calculation procedure programmed for solution on a Control Data G-15D digital computer. Several sample calculations were compared with results existing in the literature and a limited parameter study was performed with variation of the fabric surface heat transfer coefficients. Fabric test samples were irradiated in an arc image furnace test facility and the heating and degradation processes were qualitatively and quantitatively studied with a Mach-Zehnder interferometer. This instrument provided fabric surface temperature data, heat transfer coefficient information, and a better insight into the chemical processes taking place. (Author)

AD-631 383 Fld. 11/5, 11/4
CFSTI Prices: HC $4.60 MF $0.50
HUGHES AIRCRAFT CO CULVER CITY CALIF
STUDIES ON REFRACTORY FIBER RESEARCH.
Summary rept no. 1, 14 Jul 59-30 Sep 60,
by L. E. Gates, and W. E. Lent. 30 Oct 60, 49p.
Contract DA-04-495-ORD-1723,
Unclassified report

Descriptors: (*Refractory materials, Fibers), (*Fibers, Heat-resistant materials), (*Glass textiles, Preparation), (*Composite materials, Heat-resistant materials), Electric arcs, Drawing (Machine processing), Selection, Oxides, Nitrides, Carbides, Melting point, Tensile properties, Phenolic plastics, Mechanical properties

The greatest portion of the work in the program was devoted to the development of a carbon-arc fiberizing apparatus and glass fiberizing techniques. The carbon -arc provided a high temperature source capable of melting all the refractory materials investigated. The characteristics found to be most significant in fiberizing refractory glasses were the temperature, viscosity, and surface tension of the melted glass. Refractory glasses were screened by evaluating the fiberizing characteristics of their compositions, formulated according to the hypotheses of glass formation. Four oxide compositions which produced high fiber yields were selected for comparison with E-glass fibers produced by the same method. Tensile strength measurements of the fibers revealed no significant statistical difference in the strengths of the four compositions and E-glass. One refractory fiber composition was not visually affected when subjected to a temperature of 1250 C for one-half hour. Sufficient quantities of fibers were produced from the four selected refractory compositions for the fabrication of phenolic resin composite test specimens. Measurements of flexural strength, flexural modulus of elasticity, block compressive strength, and punch shear strength indicated that the refractory fiber-resin composites were slightly better than the E-glass-resin composites and compare favorably with chopped roving glass-phenolic resin composites. (Author)

AD-631 384 Fld. 11/5, 11/4, 13/8, 11/2
CFSTI Prices: HC $2.00 MF $0.50
HUGHES AIRCRAFT CO CULVER CITY CALIF
REFRACTORY FIBER RESEARCH.
Monthly status rept. nos. 1-11, 1959-60.
1960, 38p. Contract DA-04-495-ORD-1723,
Unclassified report

Descriptors: (*Refractory materials, Fibers), (*Fibers, Heat-resistant materials), (*Composite materials, Heat-resistant materials), Preparation, Drawing (Machine processing), Extrusion, Sintering, Crystal structure, Glass textiles, Phenolic plastics, Tensile properties, Molding, Phase studies, Electric arcs

The work reported was primarily an experimental investigation of techniques for producing refractory fibers and a development of refractory compositions with properties suitable for fiber synthesis. The objective of the program was to synthesize fibers of extremely refractory materials.

AD-631 428 Fld. 11/5
CFSTI Prices: HC $3.00 MF $0.75
CLOTHING AND ORGANIC MATERIALS DIV ARMY NATICK LABS MASS
EXTENT AND CAUSE OF DETERIORATION OF NYLON MOUNTAIN CLIMBING ROPE.
Technical rept.,
by Louis I. Weiner, and Leo J. Sheehan. Mar 66, 82p. Rept. no. 66-24-CM,TS-135
Proj. DA-1C024401A113,
Unclassified report

Prepared in cooperation with Boston Naval Shipyard. Materials Lab.

Descriptors. *Nylon, Degradation), (*Cordage, Degradation), Elasticity, Hardness, Mechanical properties, Abrasives, Fibers (Synthetic)

An analysis was made of 20 nylon mountain climbing ropes which had been in use for periods up to 18 years, to discover the extent and cause of deterioration in strength and energy-absorbing ability and changes in hardness and stiffness. It was found that loss in strength and energy-absorbing ability arise primarily from fiber abrasion which occurs at the surface of the rope. The nature of the rope construction is such that surface abrasion affects each of the three strands of the rope and all of the yarns in each strand except the few which constitute the so called 'inner-core.' There is no evidence that sunlight damage occurred to any significant extent in these ropes. The amount of abrasion, and loss of strength were directly related to the amount of use (not age), for those ropes that had more quantitative use histories. A Use Index (computed from the number of days of use) may be used to estimate rope deterioration. The extent of hardening and stiffening of the ropes was found to vary over a wide spectrum, but the causal factors were not determined. (Author)

AD-631 595 Fld. 11/5, 7/3
CFSTI Prices: HC $1.00 MF $0.50
FELTMAN RESEARCH LABS PICATINNY ARSENAL DOVER N J
NEW METHODS OF MODIFYING THE PROPERTIES OF CELLULOSE.
Technical translation,
by Z. A. Rogovin. May 66, 27p. Rept. no. TT-15,
TT 66-61109
Unclassified report

Trans. of Periodica Polytechnica. Engineering. Maschinen- und Bauwesen (Hungary) v5 n21 p65-87 1961.

Descriptors: (*Fibers (Natural), Cellulose), (*Cellulose, Processing), Cellulose esters, Amino acids, Carboxylic acids, Organic phosphorus compounds, Synthesis (Chemistry), Chemical research, Polymers, Aldehydes, Amides, Nitriles, Amines, Heterocyclic compounds, Copolymerization, Condensation reactions, Polymerization, Stability, Elasticity, Hungary, USSR

Results obtained in efforts to improve the properties of cellulose and its derivatives are given under the following three categories: (1) the synthesis of new cellulose derivatives; (2) the introduction of new functional groups into the cellulose macromolecule and the accomplishment of additional chemical transformations, utilizing the presence of these groups; and (3) the use of methods of modern synthetic polymer chemistry, in particular the synthesis of block and grafted copolymers of cellulose. Major shortcomings of cellulose fibers which the author states can be eliminated to a considerable degree are: (1) low stability to the action of chemical reagents, (2) low stability to the action of microorganisms and molds, (3) combustibility, (4) insufficiently high light stability, and (5) insufficiently high elasticity. (Originating agency's abstract)

11/6. METALLURGY AND METALLOGRAPHY

AD-631 388 Fld. 11/6, 20/11
JOHNS HOPKINS UNIV BALTIMORE MD
THE DYNAMIC PLASTICITY OF METALS AT HIGH STRAIN RATES: AN EXPERIMENTAL GENERALIZATION,
by James F. Bell. 1966, 24p. Contract AF 49 (638)-1067,
AFOSR 66-0336
Unclassified report

Availability: Published in Behavior of Materials under Dynamic Loading p19-41. Copies to DDC users only.

Descriptors: (*Metallic crystals, Plasticity), Dynamics, Strain (Mechanics), History, Theory, Experimental data, Deformation, Single crystals, Diffraction analysis, Mechanical waves, Stresses, Aluminum, Copper, Nickel, Lead, Gold, Silver

'Extended quasi-static' impact experiments and indirect dynamic impact experiments are critically compared with direct dynamic experiments. The success of the direct dynamic experiments in establishing the applicability of the finite amplitude wave theory to a variety of metals is described. The fact that in such direct experiments diffraction grating measurement of dynamic plastic strain and wave speeds in the symmetrical free-flight impact of polycrystals may be used to predict the stage III deformation of nearly 400 aluminum, copper, nickel, lead, gold, and silver crystals in the metal physics literature is evidence of the generality of these results. Recent experiments on initially work-hardened metals are discussed. These data include a brief description of the success of the writer's linearly temperature-dependent generalized parabolic stress-strain law governing strain rate independent finite amplitude wave propagation in predicting dynamic ultimate strength data of numerous earlier experimentalists. (Author)

AD-631 422 Fld. 11/6, 13/8
CFSTI Prices: HC $1.00 MF $0.50
WATERVLIET ARSENAL N Y BENET LABS
STRESS AGING: A NEW TREATMENT FOR ALLOYS. PART FOUR: COMPARISON OF STANDARD TENSILE PROPERTIES FOR SINGLE VS. DUPLEX STRESS-AGING (THREE ULTRA-HIGH-STRENGTH STEELS).
Technical rept.,
by Richards H. Harrington. Mar 66, 35p. Proj. DA-1-L-0-13001-A91-A
WVT 6601
Unclassified report

See also AD-609 243, AD-612 462.

Descriptors: (*Alloys, Aging (Materials)), (*Aging (Materials), Steel), (*Steel, Tensile properties), Stresses, Toughness, Titanium alloys, Heat treatment, Silicon

For alloys with a high capacity for single stress-aging, duplex stress-aging may yield further gains in useful strength without destructive losses in elongation and 'Relative Toughness'. With duplex stress-aging, the proportional limits are higher than the initial tensile strengths of these three steels. Duplex stress-aging resulted in increases of 50,000 psi for the 0.1% offset yield strength for 4340 steel; 75,000 psi for the yield strength of 4335 Si-Modified; and up to 90,000 psi for the yield strength of 300M steel. For different duplex treatments, 300M steel develops proportional limits from 280,000 to 300,000 psi; yield strengths from 300,000 to 315,000 psi; elongations from 7 to 5%; reduction of area values from 34% to 31%. On a yield strength-to-density basis, duplex stress-aged 4335 Si-Modified is about equal to titanium alloy while duplex stress-aged 300M appears to be superior to any commercial alloy. (Author)

AD-631 432 Fld. 11/6, 7/4
CFSTI Prices: HC $2.00 MF $0.50
INSTITUTE OF MODERN LANGUAGES INC WASHINGTON D C
STRUCTURE AND MORPHOLOGY OF THE HYDROXIDE LAYERS OF THE ALUMINUM SURFACES,
by Von H. Ginsberg, and K. Wefers. Apr 66, 32p. Contract DA-44-009-AMC-1563 (T), Proj. DA-1C024401A328,
AERDL T-1838-66 ,TT 66-61086
Unclassified report

Trans. of Aluminium (West Germany) v37 1961.

Descriptors: (*Aluminum, Surfaces), (*Aluminum compounds, Hydroxides), (*Hydroxides, Microstructure), Gels, Crystals, X-ray diffraction analysis, Electron microscopy, Differential thermal analysis, Spectrum (Infrared), Humidity, Corrosion, West Germany

Studies of surface layers of aluminum hydroxide by means of light optical microscopy, electron microscopy, x-ray diffraction analysis, infrared spectroscopy, and differential thermoanalysis are described; and the results and their significance are discussed. Special attention is given to the effect of handling temperature on the formation of hydroxide layers and their properties.

AD-631 512 Fld. 11/6
CFSTI Prices: HC $1.00 MF $0.50
AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C
HIGH-PURITY METALS, PART II: ANNOTATED BIBLIOGRAPHY.
Rept. no. 2 on ATD work assignment no. 79, task 21,
by Alex Zurichenko. 16 Feb 66, 25p. Rept. no. ATD-66-17,
TT 66-61093
Unclassified report

Based on Soviet and Communist-World open-source material for 1964-65. Rept. on Surveys of Communist World Scientific and Technical Literature. See also AD-624 997.

Descriptors: (*Metals, Purification), (*Bibliographies, Metals), Refining (Metallurgy), Paramagnetic resonance, Crystal growth, Single crystals, Zone melting, Heat treatment, Semiconductors

The annotated bibliography was compiled from Soviet-Satellite open sources published 1964-1965. The entries are arranged chronologically and divided into two parts by year: Part A (1964) comprises 31 entries and Part B (1965) includes 40 entries. Other elements and data discussed: zinc, electron paramagnetic resonance, single crystal growing, chemiluminescence, lithium, boron, selenide, mechanical heat treatment, arsenic, tantalum, graphite, bismuth, cesium, rhenium, mercury, iron, vacuum furnace, induction furnace, lead, indium, zone recrystallization, vanadium compound, gallium, manganese, titanium, beryllium, cerium, single crystal, boron compound, sulfur, uranium, vacuum refining, yttrium, molybdenum, gold, semiconducting material, electrolytic refining, thallium, phosphorus, silicon, antimony, tin. (Author)

AD-631 533 Fld. 11/6, 20/3
NEBRASKA UNIV LINCOLN DEPT OF ELECTRICAL ENGINEERING
CONDUCTION IN DISCONTINUOUS METAL FILMS,
by L. A. Weitzenkamp, and N. M. Bashara. 1966, 6p.

Unclassified report

See also AD-257 421.

Availability: Published in Transactions of the Metallurgical Society of AIME v236 p351-Mar 6 1966. Copies to DDC users only.

Descriptors: (*Metal films, *Electrical conductance), (*Gold, Films), Heat of activation, Electric fields, Work functions, Particle size, Electron microscopy

A study of the electrical conductivity of gold films less than 200A in thickness indicates a negative temperature coefficient of resistance and a thermal activation energy of less than 0.25 ev. The films consist of discrete metal islands of linear dimensions from a few angstroms to 1000A. Films were able to withstand applied fields up to 60,000 v per cm before breakdown occurred. A model for the conduction mechanism is proposed which involves a potential barrier due to work function, image forces, and an electrostatic potential arising from separating an electron from a neutral island leaving behind a positively charged metal island. Activation energies of less than 0.25 ev are consistent with this model, which includes a tunneling and/or thermal mechanism for conduction between the separate metal islands. An apparent saturation effect in conductivity at high fields is observed experimentally. The proposed model gives poor quantitative agreement for the internal electrical field between islands. (Author)

AD-631 543 Fld. 11/6, 7/2, 20/2
NORTH CAROLINA STATE UNIV RALEIGH DEPT OF ENGINEERING RESEARCH
DAS ZWEISTOFFSYSTEM NICKEL-BOR,
by Joachim-Dietrich Schobel, and Hans H. Stadelmaier. 15 May 65, 5p. Contract DA-31-124-ARO (D)-277,
AROD 5010:7

Unclassified report

Text in German; Attached Summary in English.

Availability: Published in Zeitschrift fuer Metallkunde v56 n12 p856-9 1965. Copies to DDC users only.

Descriptors: (*Nickel compounds, Borides), (*Nickel alloys, Phase studies), (*Boron alloys, Phase studies), Intermetallic compounds, Metallic crystals, High-temperature research

The binary system nickel-boron was studied by thermal analysis, microscopic and X-ray diffraction methods, and the results are compiled in a complete phase diagram. The range below 33.3 at.-% B exhibits a metastable partial system Ni-Ni2B within the stable system Ni-Ni3B-Ni2B. At higher boron contents there exist two phases of theoretical composition Ni4B3 which melt congruently at 1025C (o-Ni4B3, 41.4 at.-%B) and 1031C (m-Ni4B3, 43.6 at.-%B). The boride NiB is formed at 1035C by peritectic reaction of liquid and boron. (Author)

AD-631 545 Fld. 11/6
CFSTI Prices: HC $3.60 MF $0.50
NAVAL RESEARCH LAB WASHINGTON D C
THE EFFECTS OF THREE AQUEOUS ENVIRONMENTS ON HIGH STRESS LOW-CYCLE FATIGUE OF 18% NICKEL MARAGING STEELS.
Memorandum rept.,
by C. D. Beachem, and T. C. Lupton. Feb 66, 33p. Rept. no. NRL-MR-1685,

Unclassified report

Descriptors: (*Maraging steels, *Fatigue (Mechanics)), (*Nickel alloys, Maraging steels), Sodium compounds, Chlorides, Chromates, Stress corrosion

Base plate and weld specimens of 200 ksi and 250 ksi (nominal yield) grades of 18% Ni maraging steels were tested as side-grooved plane-strain cantilever beam specimens in distilled water, water 'inhibited' with NaCrO4, and 3-1/2% NaCl solution, to determine the susceptibilities of these steels to both corrosion fatigue and sustained load crack growth. Stress intensities below which negligible crack growth occurred during twenty cycles were found to be about 95% of K sub Ic for 250 grade base plate in distilled water, 73% of K sub Ic for 250 grade tested in either the salt water or the sodium chromate solution, 88% of K sub Ic for the 200 ksi grade base plate in all three environments, and essentially 100% of K sub Ic for the 200 ksi weld metal in all three environments. Crack extension was found to be negligible in twenty cycles at a K sub I of 65 ksi square root inches in the 250 ksi grade welds in all environments. (Author)

AD-631 571 Fld. 11/6
CFSTI Prices: HC $1.10 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
IMPROVING THE PLASTICITY OF SLABS OF STAINLESS STEEL WITH THE AID OF RARE-EARTH ELEMENTS,
by N. F. Nakonechnyi, K. K. Prokhorenko, and P. L. Zhdanov. 23 Mar 66, 7p. Rept. no. FTD-TT-65-1787,
TT 66-61098

Unclassified report

Unedited rough draft trans. of Metallurgicheskaya i Gornorudnaya Promyshlennost' (USSR) n1 p32-3 1964.

Descriptors: (*Stainless steel, Additives), (*Cerium alloys, Stainless steel), Rare earth elements, Plasticity, Heat-resistant metals + alloys, Microstructure, Defects (Materials), Grain boundaries, Hardness, USSR

The introduction 0.1 to 0.2% cerium during the casting of an austenite and an austenite-ferrite stainless steel was found to result in improved plasticity at high temperatures both for the cast and the forged metal. Metallographic examinations revealed that the addition of cerium in such amounts reduced the microscopic nonuniformity of the steel, strengthened its grain boundaries, and inhibited the embrittling of nonmetallic inclusions by transforming them into higher melting and more plastic compounds.

AD-631 708 Fld. 11/6
CFSTI Prices: HC $2.60 MF $0.50
GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND DEVELOPMENT CENTER
INFLUENCE OF INTERSTITIAL IMPURITIES ON THE LOW-TEMPERATURE STRENGTH AND DUCTILITY OF BODY-CENTERED CUBIC METALS.
Final rept. 14 May 63-31 Mar 66,
by D. F. Stein, and J. R. Low Jr.. Mar 66, 28p.
Contract DA-31-124-ARO (D)-95, Proj. DA-20010501B700,
AROD 4074:2

Unclassified report

Descriptors: (*Iron, Impurities), (*Molybenum, Impurities), (*Tungsten, Impurities), Ductility, Purification, Stresses, Tensile properties, Transition temperature, Controlled atmospheres, Hydrogen

A new technique for removing interstitial impurities from b.c.c. metals was devised in which a very high purity atmosphere of hydrogen was maintained over samples being heated at high temperature. For iron, this technique was shown to reduce the carbon to less than 0.005 ppm, nitrogen to less than 2 ppm, and oxygen as low as 3 ppm. The level of oxygen also depended upon the oxygen concentration in the starting material. The high-purity hydrogen purification technique was combined with other techniques such as zone melting, and high-purity arc melting to produce iron, molybdenum, and tungsten of high purity with respect to interstitial impurities. The effects of interstitial impurities on the mechanical properties of these metals were examined. (Author)

AD-631 213 **See Fld. 13/8**

AD-631 264 **See Fld. 20/12**

AD-631 272 **See Fld. 11/2**

AD-631 317 **See Fld. 20/12**

AD-631 467 **See Fld. 1/3**

AD-631 660 **See Fld. 1/3**

AD-631 679 **See Fld. 14/2**

AD-631 681 **See Fld. 13/10**

AD-631 792 **See Fld. 20/2**

11/7. MISCELLANEOUS MATERIALS

AD-631 458 Fld. 11/7, 7/5
CFSTI Prices: HC $3.00 MF $0.75
TRW SYSTEMS REDONDO BEACH CALIF
RESEARCH AND APPLICATIONS PROGRAM FOR A SOLID CHEMILUMINESCENT REACTANT.
Final rept., 28 Jun 65-31 Mar 66,
by J. L. Dyer, and W. Lusk. 31 Mar 66, 90p.
Rept. no. 4489-6007-R0000,
Contract DA-04-495-AMC-796 (A),

Unclassified report

Descriptors: (*Chemiluminescence, Materials), Oxidizers, Cerium compounds, Oxides, Physical properties, Chemical properties, Sensitivity, Aging (Materials), Compatibility, Humidity, Microstructure, Thermal properties, Intensity, Brightness, Gels, Powders

STELLER us a solid material which, when reacted with a suitable oxidizer, emits chemiluminescent light. The current oxidizer is a solution of ceric ammonium sulfate. Program activities were divided into two experimental tasks. The first task consisted of the production of the STELLER required for the program, determination of the physical and chemical properties of STELLER, sensitivity testing, and an aging and materials compatibility evaluation. The second task consisted of experimental activities which established the parameters which control the chemiluminescent performance (intensity and duration) and optimized the composition of selected formulations.

AD-631 406 **See Fld. 13/13**

11/8. OILS, LUBRICANTS, AND HYDRAULIC FLUIDS

AD-631 448 Fld. 11/8
CFSTI Prices: HC $1.00 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
THE CHANGE OF PROPERTIES OF DISPERSION MEDIA OF PLASTIC LUBRICANTS UNDER THE EFFECT OF RADIOACTIVE RADIATION,
by E. D. Makeeva, and L. A. Kumleva. 23 Mar 66, 9p. Rept. no. FTD-TT-65-1731,
TT 66-61091

Unclassified report

Unedited rough draft trans. of Khimiya i Tekhnologiya Topliv i Masel (USSR) n9 p38-40 1964

Descriptors: (*Mineral oils, Radiation damage), Aromatic compounds, Hydrocarbons, Lubricants, Plastics, Gamma rays, Selenides, Liquids, Silicon compounds, Silicone plastics, Temperature, Ethers, USSR

The change in properties of a series of oils, used in role of dispersion media of plastic lubrications, under the effect of gamma-radiation was investigated. The anti-radiation properties on these oils of admixture of two types were determined: binding free radicals (e.g. dialkylselenides) and absorbing radiation energy on account of resonance adsorption in the molecules of condensed aromatic compounds (for example, acenaphthene).

AD-631 449 Fld. 11/8
CFSTI Prices: HC $1.10 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
PREPARATION OF LOW-FREEZING-POINT OILS BY DEPARAFFINING WITH CARBAMIDE,
by M. G. Mitrofanov, and O. A. Artemeva. 23 Mar 66, 9p. Rept. no. FTD-TT-65-1509, TT 66-61092
Unclassified report

Unedited rough draft trans. of mono. Uluchshenie Kachestva i Sovershenstvovanie Proizvodstva Smazochnykh Masel, Gostoptekhizdat, Moscow, 1963 p173-6.

Descriptors: (*Lubricants, Preparation), (*Oils, Preparation), (*Mineral oils, Preparation), Wakes, Separation, Ureides, Complex compounds, Alkanes, Coolants, USSR

Results are described of studies concerning the preparation of low-freezing-point transformer and spindle oils by extracting paraffins from various petroleum distillates with carbamide.

AD-631 281 **See Fld. 7/1**

AD-631 352 **See Fld. 13/9**

AD-631 353 **See Fld. 13/9**

11/9. PLASTICS

AD-631 210 Fld. 11/9
CFSTI Prices: HC $1.00 MF $0.50
NAVAL SUPPLY RESEARCH AND DEVELOPMENT FACILITY BAYONNE N J
SURVEY AND FORECAST OF ADVANCED POLYMERIC MATERIALS APPLICABLE TO THE NAVAL SUPPLY SYSTEM (PART I).
Rept. for 1 Jun-29 Oct 65,
by H. F. Mark, and S. M. Atlas. 29 Oct 65, 20p.
Rept. no. 01-13-001-00-1-Pt-1,
Proj. RENS-T-F015-01-01-13-001-00-1,
Unclassified report

See also AD-631 211.

Descriptors: (*Plastics, State-of-the-art reviews), (*Polymers, State-of-the-art reviews), Navy, Military requirements, Fibers (Snythetic), Films, Elastomers, Adhesive, Implants, Heat-resistant materials, Polyamide plastics, Polyester plastics, Acrylic resins, Polyethylene plastics, Coatings, Crosslinking (Chemistry), Vinyl plastics, Degradation

The report presents a general technological survey of the present state-of-the-art of polymeric science as it is applicable to synthetic fibers, films, plastics, elastomers, adhesives, and materials for surgical implants and high-temperature use. A forecast is presented with particular emphasis on Naval applicability. (Author)

AD-631 211 Fld. 11/9
CFSTI Prices: HC $1.00 MF $0.50
NAVAL SUPPLY RESEARCH AND DEVELOPMENT FACILITY BAYONNE N J
SURVEY AND FORECAST OF ADVANCED POLYMERIZ MATERIALS APPLICABLE TO THE NAVAL SUPPLY SYSTEM (PART II).
Rept. for 1 Jun-29 Oct 65,
by H. F. Mark, and S. M. Atlas. 29 Oct 65, 9p.
Rept. no. 01-13-001-00-1-Pt-2,
Unclassified report

See also AD-631 210.

Descriptors: (*Plastics, State-of-the-art reviews), (*Polymers, State-of-the-art reviews), Navy, Military requirements, Films, Thermoelectricity, Thermal insulation, Fuel cells, Semiconductors, Desalination, Space flight, Space capsules, Propellants, Liquid rocket propellants, Solid rocket propellants

The report presents a general technological survey of the present state-of-the-art of polymeric science as it is applicable to energy procurement, energy transportation, desalination, space program. A forecast is presented with particular emphasis on Naval applicability. (Author)

AD-631 567 Fld. 11/9, 7/3, 7/4
CFSTI Prices: HC $1.60 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
POLYMERS CONSISTING OF AROMATIC RINGS CONJUGATED WITH HETEROATOMS,
by V. I. Nikitina, and A. I. Maklakov. 30 Mar 66, 12p. Rept. no. FTD-TT-65-1355, TT 66-61096
Unclassified report

Unedited rough draft trans. of mono. Vysokomolekulyarnye Soedineniya; Geterotsepnye Vysokomolekulyarnye, Izd-vo Nauka, Moscow, 1963 p87-90.

Descriptors: (*Polymers, Synthesis (Chemistry)), (*Amino plastics, Physical properties), (*Imides, Polymers), Aromatic compounds, Amines, Phenols, Condensation reactions, Electrical properties, Magnetic properties, Electrical conductance, Paramagnetic resonance, USSR

By the method of polycondensation of aromatic diamines and diatomic phenols, polymers were obtained--polyphenyleneimes, which contained in the chain aromatic rings, which were in conjugation with atoms of nitrogen which separated them. The electrical and magnetic properties of the polymers obtained, were investigated. All specimens possess increased electrical conductivity, have positive, static magnetic susceptibility and reveal signals of EPR in the basic state. (Author)

AD-631 655 Fld. 11/9, 11/10
CFSTI Prices: HC $4.00 MF $1.00
PLASTICS TECHNICAL EVALUATION CENTER PICATINNY ARSENAL DOVER N J
LTFERATURE SURVEY ON THERMAL DEGRADATION, THERMAL OXIDATION, AND THERMAL ANALYSIS OF HIGH POLYMERS. II.
Annotated bibliography, 1 Oct 62-1 Mar 65,
by Dorothy A. Teetsel, and David W. Levi. Jan 66, 157p. Rept. no. PLASTEC-N-10,
Unclassified report

Descriptors: (*Polymers, Thermal properties), (*Plastics, Thermal properties), (*Elastomers, Thermal properties), Pyrolysis, Oxidation, Thermal stability, Thermal analysis, Styrene plastics, Polyethylene plastics, Phenolic plastics, Dienes, Synthetic rubber, Halocarbon plastics, Polyester plastics, Acrylic resins, Epoxy plastics, Vinyl plastic, Acetal plastics, Amino plastics, Polyamide plastics, Inorganic polymers, Metalorganic compounds

A bibliography of references, many of them annotated, is presented. This bibliography is the result of a literature survey on thermal degradation, thermal oxidation and thermal analysis of high polymers. These references cover the period from about 1 October 1962 to 1 March 1965. 702 items are given. These are grouped under general and material headings. A subject index and an index of authors are provided. This bibliography brings PLASTEC Note 7 (AD-423 546) published June 1963, up-to-date. (Author)

AD-631 831 Fld. 11/9, 20/12, 7/4
CFSTI Prices: HC $2.00 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
THERMAL DEGRADATION OF AN AROMATIC POLYPYROMELLITIMIDE IN AIR AND VACUUM: III. PYROLYTIC CONVERSION INTO A SEMICONDUCTOR,
by S. D. Bruck. Oct 64, 35p. Rept. no. TG-615, Contract NOw-62-0604-c,
Unclassified report

See also AD-608 766.

Descriptors: (*Polyamide plastics, Pyrolysis), (*Semiconductors, *Imides), Paramagnetic resonance, Absorption spectrum, Resistance (Electrical), Weight, Density, Molecular structure, Heat of activation, Carriers (Semiconductors), Molecular orbitals

The pyrolytic conversion of (N,N'- (p,p'-oxydiphenylene) pyromellitimide) to semiconducting products is discussed as supported by data on electron paramagnetic resonance (EPR) absorption, specific resistivity, weight loss, density, and composition. Specific resistivities as low as 10 to 0.05 ohm-cm were obtained by vacuum pyrolysis between 620C and 850C with a simultaneous increase in density to 1.65 g/cc. The region between 575C and 620C was characterized by no appreciable weight loss, increase in density, and a sharp drop in the specific resistivity. These changes could be related to an internal reorganization of the polymer to semiconducting products, for which an activation energy of 25 plus or minus 3 kcal was calculated. The development of semiconduction in the pyrolysates occurs well below the graphitization temperature and with the retention of considerable quantities of nitrogen and oxygen. The results are explained in terms of increased mobility of current carriers facilitated by enhanced pi-orbital overlap, which in turn arises from a molecular reorganization and fusion process at sufficiently high temperatures. (Author)

AD-631 217 **See Fld. 7/3**

AD-631 218 **See Fld. 7/3**

AD-631 253 **See Fld. 7/3**

AD-631 334 **See Fld. 11/4**

11/10. RUBBERS

AD-631 655 **See Fld. 11/9**

11/12. WOOD AND PAPER PRODUCTS

AD-631 320 Fld. 11/12, 13/10, 6/6
CFSTI Prices: HC $2.00 MF $0.50
CLAPP (WILLIAM F) LABS INC DUXBURY MASS
MARINE PROTECTIVE ELEMENTS AGAINST MARINE BORERS.
Annual rept. 12 Feb 65-12 Feb 66,
by B. R. Richards, and R. E. Hillman. 12 Apr 66, 31p. Rept. no. 13461,
Contract NBy-45847,
Unclassified report

Descriptors: (*Marine borers, Pest control), (*Wood, *Protective treatments), Preservation, Fouling, Oils, Absorption, Creosote, Marine engineering

Wood coupons, 3 in. x 4 in. x 3/4 in. of all sapwood Southern Yellow Pine and all heartwood Douglas Fir comprising 27 systems of various marine protective treatments are being exposed at Boston, Massachusetts and Wrightsville Beach, North Carolina. Samples in replicates of three are removed from each treatment system at 6 month intervals, examined for marine borer attack, and the outer 1/8 in. of the faces and edges analyzed for the amount of preservative retained after exposure. After 6 months and 12 months exposure no attack was evident in the samples removed from Boston Harbor. At Wrightsville Beach, Limnoria tunnels were present in 12 systems, of which only 4 contained actual organisms. There was little difference in the average treatment retentions after 6 months and 12 months exposure. Samples removed from Wrightsville Beach after 18 months exposure showed light Limnoria activity in 9 systems. (Author)

Field 12-MATHEMATICAL SCIENCES

12/1. MATHEMATICS AND STATISTICS

AD-631 192 Fld. 12/1, 5/4
JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF STATISTICS
INFERENCE AND DISPUTED AUTHORSHIP,
by G. S. Watson. 1966, 6p. Contract Nonr-4010 (09)

Unclassified report

Availability: Published in The Annals of Mathematical Statistics v37 n1 p308-12 Feb 1966. Copies to DDC users only.

Descriptors: (*Decision theory, *Distribution theory), (*History, Documentation), Probability, Mathematical prediction, Statistical distributions, Political science, United States Government

Review of the book by F. Mosteller and D. L. Wallace, 'Inference and disputed authorship: The Federalist,' Reading, Addison-Wesley Pub. Co., 1964, concerning the disputed authorship of the 12 Federalist papers. Among the techniques used for this classification or discrimination problem is the Bayesian analysis. Also used were word frequency, cumulative strength of filler and function words (unrelated to content), stability, and independence over time and context. The book is claimed to be 'a notable addition to statistical literature almost all of which has an odour of unreality'. The authors are said to have put all their material, and prior knowledge of it, before their readers and then made an analysis in public and with soul-searching honesty.

AD-631 229 Fld. 12/1
NAVAL ORDNANCE TEST STATION CHINA LAKE CALIF
SOME GENERAL PROPERTIES OF MULTI-VALUED FUNCTIONS.
Revised ed.,
by Raymond E. Smithson. 31 Mar 64, 28p. Rept. no. NOTS-TP-4057,
NAVWEPS 9049

Unclassified report

Revision of manuscript submitted 3 Apr 63.

Availability: Published in Pacific Journal of Mathematics v15 n2 p681-703 1965. Copies to DDC users only.

Descriptors: (*Theorems, *Functions), (*Topology, Functions), Functional analysis

The object is to determine what theorems for single-valued functions can be extended to which class of multi-valued functions. It is shown that an arc cannot be mapped onto a circle by a continuous, monotone multi-valued function when the image of each point is an arc. On the other hand, the arc can be mapped onto a nonlocally connected space by a monotone, continuous function such that the image of each point is an arc. Characterizations of nonalternating functions analogous to the results in the single -valued theory are obtained, and it is shown that an nonalternating semi-single-valued continuous function on a dendrite is monotone. An analog of the monotone light factorization theorem is obtained for semi-single-valued continuous functions. Some other results are: an open continuous function with finite images maps a regular curve onto a regular curve, and a continuous function with finite images maps a locally connected, compact space onto a locally connected compact space. (Author)

AD-631 306 Fld. 12/1
CFSTI Prices: HC $1.00 MF $0.50
UNITED STATES STEEL CORP MONROEVILLE PA
FOUR-DIMENSIONAL DESCRIPTIVE GEOMETRY SYMMETRY - DESCRIPTIVE SOLUTION.
Technical seminar series (special rept.),
by C. Ernesto S. Lindgren. Mar 65, 19p. Rept. no. SR-1,

Unclassified report

Prepared for presentation at the Engineering Graphics Seminar, Princeton Univ., N. J.

Descriptors: (*Projective geometry, Graphics), Differential geometry, Drafting, Geometry

The paper presents the solution by methods of the four-dimensional descriptive geometry of the problem of symmetry of a segment of line in a four-dimensional space. (Author)

AD-631 307 Fld. 12/1
CFSTI Prices: HC $1.00 MF $0.50
UNITED STATES STEEL CORP MONROEVILLE PA
FOUR-DIMENSIONAL DESCRIPTIVE GEOMETRY REGULAR PENTATOPE - ORTHOGRAPHIC PROJECTIONS.
Special rept. (Technical seminar series),
by C. Ernesto S. Lindgren. Mar 65, 15p. Rept. no. SR-2,

Unclassified report

Prepared for presentation at the Engineering Graphics Seminar, Princeton Univ., N. J.

Descriptors: (*Projective geometry, Graphics), Differential geometry, Drafting, Geometry

AD-631 308 Fld. 12/1
CFSTI Prices: HC $1.00 MF $0.50
UNITED STATES STEEL CORP MONROEVILLE PA
SYMMETRY IN A FOUR-DIMENSIONAL SPACE.
Technical seminar series,
by C. Ernesto S. Lindgren. 22 Oct 64, 24p. Rept. no. 11,

Unclassified report

Prepared for presentation at the Engineering Graphics Seminar, Princeton Univ., N. J.

Descriptors: (*Projective geometry, Graphics), Differential geometry, Drafting, Geometry

AD-631 373 Fld. 12/1
CFSTI Prices: HC $1.00 MF $0.50
PENNSYLVANIA UNIV PHILADELPHIA
DIFFERENTIABLE TRANSFORMATION GROUPS ON HOMOTOPY SPHERES.
Interim technical rept.,
by Chung-Tao Yang. 1965, 26p. Rept. no. 3, Contract DA-31-124-ARO (D)-123, Proj. DA-20014501B14C,
AROD 2056:16

Unclassified report

Rept. on proj: Topological Transformation Groups.

Descriptors: (*Groups (Mathematics), *Algebraic topology), Spheres, Differential geometry, Transformations (Mathematics)

Techniques and results of differentiable topology are employed in the study of differentiable transformation groups. This paper differs from recent works with the same objective in that pasting techniques rather than bordism theory are used. (Author)

AD-631 376 Fld. 12/1
MINNESOTA UNIV MINNEAPOLIS
THE ISOPERIMETRIC INEQUALITY FOR MULTIPLY -CONNECTED MINIMAL SURFACES,
by Johannes C. C. Nitsche. 14 Apr 65, 5p. Contract AF-AFOSR-883-65,
AFOSR 66-0214

Unclassified report

Published in Bulletin of the American Mathematical Society v71 n5 p750-2 Sep 1965. Copies to DDC users only.

Descriptors: (*Inequalities, *Differential Geometry), Topology, Calculus of variations, Conformal mapping

AD-631 377 Fld. 12/1
MINNESOTA UNIV MINNEAPOLIS
THE ISOPERIMETRIC INEQUALITY FOR MULTIPLY -CONNECTED MINIMAL SURFACES,
by Johannes C. C. Nitsche, and Heinz Hopf. 27 Mar 65, 7p. Contract AF-AFOSR-883-65,
AFOSR 66-0216

Unclassified report

Availability: Published in Math. Annalen. v160 p370-5 1965. Copies to DDC users only.

Descriptors: (*Inequalities, *Differential geometry), Topology, Calculus of variations, Conformal mapping

AD-631 378 Fld. 12/1
MINNESOTA UNIV MINNEAPOLIS
ON THE NON-SOLVABILITY OF DIRICHLET'S PROBLEM FOR THE MINIMAL SURFACE EQUATION,
by Johannes C. C. Nitsche. 1965, 11p. Contract AF-AFOSR-883-65,
AFOSR 66-0215

Unclassified report

Availability: Published in Journal of Mathematics and Mechanics v14 n5 p779-88 Sep 1965. Copies to DDC users only.

Descriptors: (*Boundary value problems, (*Differential geometry), Topology, Potential theory

AD-631 380 Fld. 12/1
MICHIGAN UNIV ANN ARBOR DEPT OF MATHEMATICS
THE POWER GROUP OF TWO PERMUTATION GROUPS,
by Frank Harary, and Ed Palmer. 26 Jul 65, 3p. Contract AF-AFOSR-754-65,
AFOSR 66-0194

Unclassified report

Communicated by Mark Kac.

Availability: Published in Proceedings of the National Academy of Sciences v54 n3 p680-2 Sep 1965. Copies to DDC users only.

Descriptors: (*Groups (Mathematics), *Permutations), Combinatorial analysis, Polynomials, Theory

AD-631 385 Fld. 12/1
HAMLINE UNIV ST PAUL MINN
ON ABSOLUTELY CONTINUOUS FUNCTIONS,
by Dale E. Varberg. 1956, 12p. Contract AF-AFOSR-35-65, Proj. AF-9749, Task 974902, AFOSR 66-0219

Unclassified report

Availability: Published in American Mathematical Monthly v72 n8 p831-41 Oct 1965. Copies to DDC users only.

Descriptors: (*Functions, *Real variables), Inequalities, Measure theory

The purpose of the note is to discuss the concept of absolute continuity for functions of a real variable. This topic has been well explored so most of the results are not new. What is new is the approach. The author begins with an elegant inequality which he discovered lying buried as an innocent problem in Natanson's book (Theory of Functions of a Real Variable). From this inequality many well-known and some new results follow in an almost trivial fashion.

AD-631 386 Fld. 12/1
CFSTI Prices: HC $1.60 MF $0.50
AEROSPACE RESEARCH LABS OFFICE OF AEROSPACE RESEARCH WRIGHT-PATTERSON AFB OHIO
DETERMINANTAL EVALUATION OF EIGENVALUES.
Scientific rept.,
by Donald S. Clemm. Jan 66, 15p. Rept. no. ARL-66-0017,
Proj. AF-7071,

Unclassified report

Descriptors: (*Matrix algebra, Numerical methods + procedures), Determinants, Programming (Computers)

The numerical determination of the eigenvalues of a matrix consists of two phases; one, the isolation of the eigenvalues and, two, the calculation proper. The report concerns itself with the second phase and assumes that the first, probably more difficult, phase has been accomplished. The method presented requires the lower and upper bounds of the distinct real eigenvalues of a real matrix to be known beforehand. By an iterative procedure, involving the evaluation of determinants, the lower bound is increased and/or the upper decreased until agreement is achieved between them to a specified number of digits. Multiple eigenvalues can not be determined by this method. All eigenvalues are obtained to the same number of significant figures, which should be especially helpful when working with a matrix whose eigenvalues have very wide dispersion. A discussion of scaling is included which is applicable to many matrix problems, regardless of the method used to get numerical results. A table appears which compares the results obtained from using this method with those of another, when both procedures were applied to a specific problem. A Fortran IV computer program has been written embodying the principles contained herein. (Author)

AD-631 391 Fld. 12/1
MITRE CORP BEDFORD MASS
RANDOM ERRORS OF DERIVATIVES OBTAINED FROM LEAST SQUARES APPROXIMATIONS TO EMPIRICAL FUNCTIONS,
by Hans C. Joksch. 1966, 13p. Rept. no. TM-4109,
Contract AF 19 (628)-2390, Proj. AF-7070, ESD TR-65-83

Unclassified report

Availability: Published in SIAM Review v8 n1 p47-56 Jan 1966. Copies to DDC users only.

Descriptors: (*Least squares method, *Statistical functions), Analysis of variance, Stochastic processes, Errors, Polynomials

If a polynomial approximation is fitted to empirical values of a function, the approximation is influenced by the errors of the given values and can be considered as a random function. If derivatives are desired from the approximating polynomials, they are also random functions. For special cases, estimates of the variances of the first two derivatives as functions of the variance of the given values, their number and the degree of approximation are desired. Also, exact values for certain continuations of these parameters are presented. (Author)

AD-631 395 Fld. 12/1
STANFORD UNIV CALIF DEPT OF MATHEMATICS
FIELDS, OPTIONALITY AND MEASURABILITY,
by K. L. Chung, and J. L. Doob. 8 Jun 64, 33p.
Contract AF 49 (638)-1339, Proj. AF-9749, Task 974902,
AFOSR 66-0249

Unclassified report

Prepared in cooperation with Illinois Univ., Urbana.

Availability: Published in American Journal of Mathematics v87 n2 p397-424 Apr 1965. Copies to DDC users only.

Descriptors: (*Statistical processes, *Measure theory)

AD-631 439 Fld. 12/1, 9/2
CFSTI Prices: HC $3.00 MF $0.50
PACIFIC MISSILE RANGE POINT MUGU CALIF
"T-BOUNDS" FOR COMPUTATIONS: UPPER AND LOWER BOUNDS FOR CALCULATIONS AND DATA REDUCTION.
Technical rept.,
by C. J. Thorne, and R. W. Claassen. 1 May 65, 93p. Rept. no. pmr-TR-66-1,

Unclassified report

Descriptors: (*Programming (Computers), *Numerical analysis), Optimization, Matrix algebra, Algebra, Special functions (Mathematical)

Basic Arithmetic: Optimum bounds are given for independent variable arithmetic operations on desk calculators or high-speed computers. These bounds are designated as 'T-bounds.' Efficient IBM 7094 machine language codes for these arithmetic operations are listed. Examples are included. Results for an Inverse Matrix: Bounds for the test matrix whose elements are a sub ij = 1/ (i + j - 1) are calculated for single-precision floating-point IBM 7094 arithmetic. An inviting conjecture for improved accuracy is noted. Function Routines: T-bound computer routines for the square-root, sine, cosine, arc-tangent, and exponential functions are listed and their theoretical bases discussed. (Author)

AD-631 441 Fld. 12/1
CFSTI Prices: HC $2.60 MF $0.50
HARVARD UNIV CAMBRIDGE MASS DEPT OF STATISTICS
A PROGRAMMING ALGORITHM AND ITS STATISTICAL APPLICATIONS.
Technical rept.,
by Samprit Chatterjee. 15 Feb 66, 28p. Rept. no. TR-1,
Contract Nonr-1866 (37), Proj. NR-042-097,

Unclassified report

Descriptors: (*Algorithms, *Nonlinear programming), (*Statistical analysis, Nonlinear programming), Sampling, Programming (Computers)

An algorithm is presented for the solution of a nonlinear programming problem and its use in survey sampling and statistical estimation is indicated. (Author)

AD-631 452 Fld. 12/1
CFSTI Prices: HC $3.00 MF $0.75
HARVARD UNIV CAMBRIDGE MASS DEPT OF STATISTICS
TRANSLATIONS FROM JAMES BERNOULLI.
Technical rept.,
by Bing Sung. 12 Feb 66, 85p. Rept. no. TR-2,
Contract Nonr-1866 (37), Proj. NR-042-097,

Unclassified report

Descriptors: (*Probability, Theory), (*Statistical analysis, History), Decision theory, Stochastic processes

Preface commenting on the translations from the Latin contents. Part 4 of Ars Conjectandi (the art of conjecturing, 1713, 'showing the use and application of the preceding treatise in civil, moral, and economic affairs': (1) Certain preliminaries about the certainty probability, necessity, and contingency of events; (2) About science and conjecture; about the art of conjecturing: about proofs of conjectures; certain general axious pertaining hereto; (3) About various kinds of proofs and how their weights should be valued for reckoning the probabilities of things; (4) About the two ways of investigating the numbers of cases; how one must view the way which is based on trials; the main problem for the way based on trials; and other matters pertaining hereto; (5) The solution to the proceding problem. Translations of excerpts from correspondence during 1703 and 1704 between Leibnitz and Bernoulli, published in 1855 (Leibnizens Mathematische Schriften, herausgegeben von C. I. Gerhardt. Erste Abteilung, Band III, Hille): (1) p. 71, paragraph 'P. S. ... omnes'; (2) p. 77-8, paragraph 'Scire libenter ... fieri perceperm; (3) p. 83-4, paragraph 'Utilissima est ... apparet;' (4) p. 87-9, paragraph 'Quod doctrina ... ventilata fuit'.

AD-631 536 Fld. 12/1
NATIONAL BUREAU OF STANDARDS WASHINGTON D C
ERROR ANALYSIS OF PHASE-INTEGRAL METHODS. I. GENERAL THEORY FOR SIMPLE TURNING POINTS,
by F. W. J. Olver. 1 Jul 65, 20p. Proj. ARO (D)-4238-M
AROD 4238:4

Unclassified report

Availability: Published in Journal of Research of the National Bureau of Standards, B. Mathematics and Mathematical Physics v69B n4 p271-90 Oct-Dec 1965. Copies to DDC users only.

Descriptors: (*Approximation (Mathematics), *Differential equations), Errors, Theory, Integrals

AD-631 537 Fld. 12/1, 9/5
NATIONAL BUREAU OF STANDARDS WASHINGTON D C
ERROR ANALYSIS OF PHASE-INTEGRAL METHODS. II. APPLICATION TO WAVE-PENETRATION PROBLEMS,
by F. W. J. Olver. 1 Jul 65, 10p. Rept. no. paper no. 69B4-158,
Proj. ARO (D)-4238-M
AROD 4238:5

Unclassified report

Availability: Published in Journal of Research of the National Bureau of Standards v69B n4 p291-300 Oct-Dec 1965. Copies to DDC users only.

Descriptors: (*Approximation (Mathematics), *Differential equations), (*Wave transmission, Potential theory), Harmonic generators, Errors, Integrals

AD-631 619 Fld. 12/1
CFSTI Prices: HC $1.00 MF $0.50
MICHIGAN STATE UNIV EAST LANSING DEPT OF STATISTICS
A PAIR OF COMPLEMENTARY THEOREMS ON CONVERGENCE RATES IN THE LAW OF LARGE NUMBERS.
Technical rept.,
by C. C. Heyde, and V. K. Rohatgi. Dec 65, 20p.
Rept. no. MSU-RM-153-VKR-1,RR-6/VKR-1
Contract Nonr-2587 (05)
Unclassified report

Descriptors: (*Theorems, Sequences), (*Number theory, *Sequences), Stochastic processes

AD-631 621 Fld. 12/1
MINNESOTA UNIV MINNEAPOLIS
ON DIFFERENTIAL EQUATIONS OF MODE 2,
by J. C. C. Nitsche. 10 Jul 64, 10p. Contract Nonr-710 (54),AF-AFOSR-883-65
AFOSR 66-0263
Unclassified report

Availability: Published in Proceedings of the American Mathematical Society v16 n5 p902-8 Oct 1965. Copies to DDC users only.

Descriptors: (*Differential equations, Theory); Differential geometry

AD-631 784 Fld. 12/1
CFSTI Prices: HC $3.00 MF $0.50
HEBREW UNIV JERUSALEM (ISRAEL)
UNIFORM EXTENSION OPERATORS FOR MODELS AND THEIR APPLICATIONS.
Technical rept.,
by Haim Gaifman. Dec 65, 58p. Rept. no. TR-21,
Contract N62558-3882, Proj. NR-049-130,
Unclassified report

Presented in the 1965 Logic Colloquium in Leicester, England.

Descriptors: (*Operators (Mathematics), *Model theory), (*Automata, Model theory), Mathematical models, Israel

The notion of an operator which maps in a uniform way every model in its domain to a proper elementary extension, is defined. Applications concerning models with 'many' automorphisms, as well as the structure of models of Peano's arithmetic are proved. (Author)

AD-631 788 Fld. 12/1
SYRACUSE UNIV N Y
MATRIX FACTORIZATIONS OF DETERMINANTS AND PERMANENTS,
by W. B. Jurkat, and H. J. Ryser. 15 Jul 64, 27p.
Contract DA-31-124-ARO (D)-36,
AROD 3901:7
Unclassified report

Availability: Published in Journal of Algebra v3 n1 p1-27 Jan 1966. Copies to DDC users only.

Descriptors: (*Matrix algebra, *Determinants), Combinatorial analysis, Polynomials, Inequalities

AD-631 829 Fld. 12/1
CFSTI Prices: HC $5.00 MF $1.00
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
TABLES AND CURVES OF THE ERLANG DISTRIBUTION FUNCTION FOR K=1 THROUGH K=25,
by Sterling I. Solomon, and Ernest L. Staples.
Jul 64, 172p. Rept. no. TG-579,PAM-79
Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Distribution functions, *Tables), (*Graphics, Distribution functions), Queueing theory

Experience has shown that many queueing situations, which are difficult or impossible to treat analytically, may be handled quite readily by simulation. An early consideration must be a choice of 'arrival' and 'service' distributions and the methods one uses for their simulation. This paper discusses the 'Erlang family' of arrival and service time distributions which is highly useful in queueing applications. Included are tables and curves of the cumulative Erlang distribution function and directions for their use in the simulation of waiting line situations.

AD-631 231 **See Fld. 20/8**

AD-631 243 **See Fld. 20/10**

AD-631 255 **See Fld. 20/10**

AD-631 258 **See Fld. 20/11**

AD-631 292 **See Fld. 20/10**

AD-631 350 **See Fld. 1/3**

AD-631 351 **See Fld. 1/3**

AD-631 363 **See Fld. 20/11**

AD-631 495 **See Fld. 14/4**

AD-631 552 **See Fld. 13/8**

AD-631 615 **See Fld. 9/4**

AD-631 635 **See Fld. 9/2**

AD-631 652 **See Fld. 22/3**

AD-631 654 **See Fld. 20/11**

AD-631 691 **See Fld. 9/5**

AD-631 716 **See Fld. 8/2**

AD-631 755 **See Fld. 5/1**

AD-631 779 **See Fld. 5/7**

AD-631 804 **See Fld. 22/3**

12/2. OPERATIONS RESEARCH

AD-631 279 Fld. 12/2, 6/16
CFSTI Prices: HC $2.60 MF $0.50
PARKE MATHEMATICAL LABS INC CARLISLE MASS
SHAPE RECOGNITION, PRAIRIE FIRES, CONVEX DEFICIENCIES AND SKELETONS.
Scientific rept.,
by Lorenzo Calabi, and William E. Hartnett. Feb 66, 24p. Rept. no. Scientific-1,
Contract AF 19 (628)-5711, Proj. AF-4645,
Task 464503,
AFCRL 66-167
Unclassified report

Descriptors: (*Mathematical models, *Visual perception), Convex sets, Pattern recognition, Fires, Flame propagation

To every closed subset A of the Euclidean plane is associated its convex deficiency D and its skeletal pair (S,q). Extending a known result (A is convex iff S = phi iff D = phi) one can prove: different sets have the same skeletal pair iff they have the same convex deficiency. Several other results are presented concerning the correspondence A approaching (S,q) and the properties of S and q. The relevance of these notions and theorems for a mathematical model of visual perception is emphasized. (Author)

AD-631 289 Fld. 12/2
CFSTI Prices: HC $3.00 MF $0.75
MITRE CORP BEDFORD MASS
METRIZED SCHEDULING RELATIONS AND APPLICATIONS.
Technical rept.,
by J. F. Rial. Mar 66, 58p. Rept. no. MTR-69,
Contract AF 19 (628)-5165, Proj. 604,
ESD TR-66-67
Unclassified report

Descriptors: (*Scheduling, *Mathematical logic)

The definitions of scheduling relations previously presented by the author are extended in this report to allow the translation of a relation net into an exact schedule. Time conditional conflicts in scheduling relation nets are detected and resolved by operating on extended versions of the bilateral implication and truth tables. (Author)

AD-631 311 Fld. 12/2, 15/5
CFSTI Prices: HC $2.00 MF $0.50
RAND CORP SANTA MONICA CALIF
CAPACITATED TRANSPORTATION PROBLEM WITH CONVEX POLYGONAL COSTS,
by G. W. Graves, and R. M. Thrall. Apr 66, 46p.
Rept. no. RM-4941-PR,
Contract AF 49 (638)-1700,
Unclassified report

Descriptors: (*Linear programming, *Transportation), Cost effectiveness, Armed forces supplies, Algorithms, Functions

This memorandum considers an extension of the classical transportation problem. In problems of this type, a minimal cost schedule is derived for shipping a commodity from a set of origins to a set of destinations. However, in the classical model, the only constraints permitted are total capacities at origins and destinations, and the cost is strictly a linear function of the amount shipped on any route. The extension presented here enables us to put an upper bound on each individual route. Furthermore, it permits us to impose increased or penalty costs for excessive amounts shipped on any individual route. The greater realism possible with this model should be of value of anyone concerned with transportation problems. Constructive proofs leading to a machine-oriented algorithm are given for the extension considered. The basic technique employed is a labelling process similar to that used by Ford and Fulkerson for the general network problem, and by Balinski and Gomory for the standard transportation problem. The objective of the present work is to trade off some of the generality of the general network problem for increased computational efficiency. It is conjectured, on the basis of limited hand calculations and certain theoretical features, that the present algorithm will also be useful for the standard transportation problem. (Author)

AD-631 314 Fld. 12/2, 1/1, 22/1
CFSTI Prices: HC $11.60 MF $0.75
SYSTEMS TECHNOLOGY INC HAWTHORNE CALIF
INVESTIGATIONS OF DESCRIBING FUNCTION TECHNIQUE.
Technical rept., 15 Jan-Nov 64,
by Dunstan Graham, and Lee Gregor Hofmann.
Feb 66, 111p. Contract AF 33 (615)-1474,
Proj. AF-8219, Task 821904,
AFFDL TR-65-137
Unclassified report

Descriptors: (*Approximation (Mathematics), Functions), (*Control systems, Nonlinear systems), Aircraft, Satellite attitude, Attitude control systems, Aerodynamic characteristics

Three problems were chosen so as to explore some of the apparent limitations of describing function technique for the analysis of nonlinear systems,

and to show how the technique might be extended so as to overcome the indicated deficiencies. The problems were (a) the effects of stick and valve friction in fully powered, manual aircraft control systems, (b) limit cycles in satellite attitude control with off-on jets, and (c) the effects of aerodynamic hysteresis in the stability derivatives of tilt-wing VTOL aircraft. The results indicate that new describing functions can be developed as closed-loop functions provided that specific restrictions are met, that non-sinusoidal, Fourier series describing functions or a generalized periodic input describing function can be successful, but that they are extraordinarily difficult to apply, and that the aerodynamic nonlinearities which were considered are of small practical importance. (Author)

AD-631 370 Fld. 12/2, 6/3, 20/4
CFSTI Prices: HC $1.00 MF $0.50
OPERATIONS RESEARCH CENTER UNIV OF CALIF BERKELEY
ON STEADY-STATE INTERCOMPARTMENTAL FLOWS.
Research rept.,
by Simon A. Levin, James Bigelow, and George B.Dantzig. Aug 65, 16p. Rept. no. ORC-65-26, Contract Nonr-222 (83),PHS-GM-9606 Proj. NR-047-033,RR-003-07-0
Unclassified report

Descriptors: (*Transport properties, Mathematical models), Biology, Physics, Set theory

The flow between compartments in physical and biological systems is treated as a special case of a more general theory of transitions between any two distinct sets. Interest is focused on the flow rate from each set, i.e., the rate at which elements from that set appear in the other; and on the entry rate from each, i.e., the rate at which elements from the set leave to enter the region not part of either set. In particular, the two flow rates are completely determined by means of explicit expressions for their rates and difference in terms of the two entry rates. An application to biological transport problems extends a result of Dantizig and Pace by demonstrating that for a system of channels each narrow enough to effect a 'lining-up' of particles, counter-gradient flows may result, i.e., flows for which the flow rate is greatest from the compartment with the smallest entry rate. (Author)

AD-631 528 Fld. 12/2
CFSTI Prices: HC $1.00 MF $0.50
CONNECTICUT UNIV STORRS DEPT OF STATISTICS
BIBLIOGRAPHY ON STATISTICAL ROBUSTNESS AND RELATED TOPICS.
Research rept.,
by Donald Fridshal, and Harry O. Posten. Jan 66, 22p. Rept. no. RR-16,
Contract Nonr-3292 (03) Task NR-042-250,
Unclassified report

Descriptors: (*Bibliographies, *Statistical processes), Statistical tests, Analysis of variance

This bibliography consists of 252 references in the area of statistical robustness. It is an attempt to provide an up-to-date comprehensive collection of references in this general statistical area. (Author)

AD-631 551 Fld. 12/2
CARNEGIE INST OF TECH PITTSBURGH PA
AN INFINITE LINEAR PROGRAM WITH A DUALITY GAP.
Revised ed.,
by R. J. Duffin, and L. A. Karlovitz. Oct 64, 14p. Contract DA-ARO (D)-31-124-G78, AROD 223:65
Unclassified report

Revision of manuscript submitted Apr 64. Prepared in cooperation with Western Reserve Univ., Cleveland, Ohio.

Availability: Published in Management Science v12 n1 p122-34 Sep 1965. Copies to DDC users only.

Descriptors: (*Linear programming, Theory), Inequalities

The first part of the paper is concerned with the semi-infinite linear programs studied by Charnes, Cooper and Kortanek. A form of the Farkas lemma stated by Haar appears to apply to such programs and leads to a duality theorem. An example of a semi-infinite program is given which is consistent and which has a finite minimum. However the dual program is found to be inconsistent. With a variation of the example a situation is exhibited in which both the program and its dual are consistent and have finite extrema. In this case, however, the minimum of the former is not equal to the maximum of the latter. The existence of such a 'duality gap' indicates that Haar's statement needs qualification. In the second part of the paper a correct form of Haar's theorem is stated and proved. The proof invokes the infinite programming theory of Duffin and Kretschmer. The last part of the paper develops a new duality theory for infinite programs which, as a special case, insures a weak form of duality for programs typified by the examples. This new duality theory is somewhat simpler than previous theories of infinite programming. (Author)

AD-631 810 Fld. 12/2
CFSTI Prices: HC $2.00 MF $0.50
OPERATIONS RESEARCH CENTER UNIV OF CALIF BERKELEY
BLOCK TRIANGULARIZATION OF MULTI-STATE LINEAR PROGRAMS.
Research rept.,
by Romesh Saigal. Mar 66, 42p. Rept. no. ORC-66-9,
Contract Nonr-222 (83),NSF-GP-4593 Proj. RR-003-07-01,
Unclassified report

Prepared in cooperation with NIH, grant PHS-GM-9606-05.

Descriptors: (*Linear programming, *Matrix algebra), Algorithms, Combinatorial analysis

In this work a variant of the Revised Simplex Method is developed for solving a Multistage Linear Program in which the output of one stage is an input to the next. The method is devised to use the special staircase structure of the original basis. It essentially reduces this basis into a block triangular working basis by a set of elementary column operations. The use of the working basis in place of the original now involves the inversion of the diagonal blocks which are considerably smaller in size (of the order of 1/n th of the original in an n-stage problem). Thus the work involved and the storage required is considerably less. An efficient procedure is developed for updating the working basis. The method consists of interchanging the dropping column to the last stage effected by the pivot on a diagonal block. The updated diagonal blocks are then obtained by a cascade pivot in which the dropping column of each stage is entered into the next until the column leaving the basis is dropped. (Author)

AD-631 736 **See Fld. 5/3**

Field 13-MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

13/1. AIR CONDITIONING, HEATING, LIGHTING, AND VENTILATING

AD-631 325 Fld. 13/1
CFSTI Prices: HC $4.00 MF $1.00
TRANE CO LA CROSSE WIS
NOMINAL 9,000 BTU/HR, COMPACT, VERTICAL, 230-VOLT, SINGLE-PHASE, 60-CYCLE (MODEL CE11VAL6-230) AND 208-VOLT, 3-PHASE, 400-CYCLE (MODEL CE11VAL4-208) AIR CONDITIONING UNITS.
Final engineering rept.,
by Paul E. Chappell. Dec 65, 133p. Contract DA-44-009-eng-4604, Task 1D643303D54503, AERDL 1841
Unclassified report

Descriptors: (*Air conditioning equipment, Tests), Military requirements, Prefabricated buildings

Capacity, airflow, and environmental tests are described. The report concludes that: (a) The CE11VAL6-230 and CE11VAL4-208 vertical, compact, lightweight units have met the design objectives of compact, lightweight construction. (b) The units have successfully completed all environmental requirements and have demonstrated adequate characteristics for withstanding hard military usage. (c) The units have demonstrated high cooling capacities and advantageous airflow characteristics. (d) The units have successfully met all development requirements and are highly recommended for applications which require large cooling capacities in a small, compact space envelope with a high degree of reliability. (e) The units have demonstrated satisfactory NC-60 to NC-70 noise -level characteristics as a result of the noise-reduction modifications. (Author)

AD-631 358 Fld. 13/1, 22/2, 20/13
CFSTI Prices: HC $2.60 MF $0.50
ROME UNIV (ITALY) SCUOLA DI INGEGNERIA AERONAUTICA
THERMAL AND STRUCTURAL ANALYSIS OF SPACE RADIATOR SYSTEMS.
Technical note,
by Luigi Broglio. Aug 61, 30p. Rept. no. SIAR-graph-59bis,TN-3
Contract AF 61 (052)-429,
Unclassified report

Descriptors: (*Radiators, Spacecraft components), Cylindrical bodies, Structural shells, Heat transfer, Thermal conductivity, Specific heat, Thermal stresses, Fluid flow, Structural properties

The paper is divided into four parts. In Part I the problem is studied referring to an element of radiator consisting of a hollow infinite cylinder, heated from inside, with axial symmetry, and cooled from outside, still with axial symmetry, through spontaneous radiation. In Part II the influence of the variation of thermal conductivity and of specific heat with temperature is taken into account. In Part III the particular case of steady flow is considered. In Part IV thermal stresses are studied, for the case of the cylinder of small thickness. Some numerical examples complete the work. (Author)

AD-631 359 Fld. 13/1, 20/13, 22/2
CFSTI Prices: HC $2.60 MF $0.50
ROME UNIV (ITALY) SCUOLA DI INGEGNERIA AERONAUTICA
RADIATOR STUDY IN SPACE ENVIRONMENT.
Technical rept.,
by Luigi Broglio. Sep 61, 27p. Rept. no. SIAR-graph-60,
Contract AF 61 (052)-429,
Unclassified report

Descriptors: (*Radiators, Spacecraft components), Heating, Convection (Heat transfer), Cooling, Radiation (Heat transfer), Condensers (Liquefiers), Turbines, Electric power production, Space propulsion

Part I essentially deals with the theoretical phase of the research. The problem is that of a solid conductive wall with convective heating from one side, and radiation cooling from the other side. Re-

quirements are briefly discussed for the method of approach, that should include transient phases, nonlinearities, applicability to whatever shape. Part II describes the tests apparatus and technique, which essentially is a comparison technique, and shows some of the results which have been obtained. Part III describes implication of results in possible future work. (Author)

AD-631 399 Fld. 13/1, 20/13, 22/2
CFSTI Prices: HC $2.00 MF $0.50
ROME UNIV (ITALY) SCUOLA DI INGEGNERIA AERONAUTICA
STEADY TEMPERATURES AND THERMAL STRESSES IN A SPACE RADIATOR ELEMENT.
Final technical rept.,
by Paolo Santini. Oct 63, 46p. Rept. no. SIAR-graph-68,
Contract AF 61 (052)-429.
Unclassified report

Descriptors: (*Radiators, Spacecraft components), Cylindrical bodies, Thermal stresses, Temperature, Distribution, Simultaneous equations, Graphics, Transcendental functions, Thermodynamics

The paper describes the general investigation in the field of steady temperature and thermal stresses distribution for an element of radiator, of cylindrical geometry. A set of two simultaneous equations is written, and graphs are prepared, from which the temperature distribution can be immediately calculated. Also, for thermal stresses, the employment of extensively tabulated functions is required. (Author)

AD-631 436 Fld. 13/1
CFSTI Prices: HC $1.10 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
AUTOMATIC DEVICE FOR TEMPERATURE CONTROL,
by E. M. Kravchuk, and N. I. Salivon. 23 Mar 66, 7p. Rept. no. FTD-TT-65-1670, TT 66-61089
Unclassified report

Unedited rough draft trans. of Inzhenerno-Fizicheskii Zhurnal (USSR) v7 n2 p43-4 1964.

Descriptors: (*Temperature control, Automatic), Thermal conductivity, Time, Temperature, Radiation (Heat transfer), Thermocouples, Thermometers, USSR

To determine the coefficients of temperature conductivity and heat conductivity of different materials based on the solution of problems in the propagation of heat in semiorganic bodies frequently one has to maintain on the flat surface of a specimen (or calibrating device) a temperature which changes in time in accordance with some law. Such a law can be, for example, a 'stepwise' function, a sinusoid, or a linear function (regular heat system of the second order). The proposed device represents an automatic regulator with a closed circuit of control. For reducing the constant of time of the heat link there is used radiation heating.

AD-631 581 Fld. 13/1, 20/13
CFSTI Prices: HC $1.60 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
SOME DATA ON THE EFFECT OF ADDED OXYGEN ON HEAT EMISSION AS SODIUM FLOWS THROUGH A COOLED PIPE,
by A. S. Andreev, E. D. Fedorovich, and A. V. Shchedrin. 23 Mar 66, 12p. Rept. no. FTD-TT-65-1511, TT 66-61103
Unclassified report

Unedited rough draft trans. of mono. Zhidkie Metally Sbornik Statei, n.p. 1963 p109-13.

Descriptors: (*Liquid metal coolants, Additives), (*Sodium, Thermal properties), Thermal conductivity, Thermal radiation, Heat transfer, Inhibition, Oxygen, Sodium compounds, Oxides, Deposition, Heat exchangers, Pipes, USSR

The solving of the problem of 'contact' thermal resistance which was discovered in working with liquid-metal heat carriers, particularly with alkali metals, to a great extent determines the effectiveness and dependability of heat-exchange equipment. The presence of 'contact' resistance outwardly reveals itself in the lowering of the coefficient of heat emission as compared with the theoretical values, and also in the instability of the heat exchange in time. Work was carried out for the purpose of obtaining data on the effect on the extent of this 'contact' resistance on temperature conditions and its relationship to relative content of oxygen in the sodium. The results of the experiments indicate that the cause of the phenomenon of contact thermal resistance on a cooled surface is the admixture of sodium oxide deposited from the liquid metal.

AD-631 224 **See Fld. 9/1**

AD-631 357 **See Fld. 20/13**

AD-631 420 **See Fld. 13/13**

AD-631 475 **See Fld. 13/13**

AD-631 576 **See Fld. 9/5**

13/2. CIVIL ENGINEERING

AD-631 322 Fld. 13/2, 8/12
CFSTI Prices: HC $1.00 MF $0.50
NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF
POLAR CAMP IMPROVEMENTS - WATER SYSTEM USING A HOT-WATER SNOW MELTER.
Technical rept. Feb 64-Feb 65,
by C. R. Hoffman, and G. E. Sherwood. Mar 66, 21p. Rept. no. TR-R-441,
Proj. Y-F015-11-01-105,
Unclassified report

Descriptors: (*Water supplies, *Snow), Polar regions, Melting, Water, Heaters, Water filters, Water tanks, Civil engineering

Unsatisfactory operation of an electric snow melter in the Deep Freeze 64 NCEL camp led to the development of a hot-water snow-melting system using excess capacity in the camp water heater as the heat source. In tests of the semiautomatic hot-water melter, water was produced at a rate of 100 gph. This compared to 60 gph with the electric immersion heater snow melter which had been designed to operate on excess generator capacity available during periods of nonpeak electrical load. The hot-water snow melter was used throughout the Deep Freeze 65 summer season to produce about 250 gpd. It was a fast and efficient melter, and had the advantage of employing standard parts whichwere easily assembled and operated. It was concluded that the hot-water melter should be considered for use in camps obtaining water by melting surface snow. (Author)

AD-631 519 Fld. 13/2, 13/13
ARMY COASTAL ENGINEERING RESEARCH CENTER WASHINGTON D C
BREAKWATERS WITH VERTICAL AND SLOPING FACES,
by Thorndike Saville Jr., William J. Garcia Jr., and Charles E. Lee. Feb 66, 27p. Rept. no. R.2-66,
Unclassified report

Prepared in cooperation with Waterways Experiment Station, Vicksburg, Miss., and Office, Chief of Engineers, Washington, D. C.

Availability: Published in International Navigation Congress (21st) Stockholm (Sweden). Sect 2, subj. 1 p1-25 1965. Copies to DDC users only.

Descriptors: (*Breakwaters, State-of-the-art reviews), (*Civil engineering, Breakwaters), Experimental design, Hydraulic models, Hydrodynamics, Seacoast

This paper presents a summary of methods currently used in the United States for design of breakwater structures, incorporating within it advances made since previous U.S. presentations at the Navigation Congresses. In addition, the results of some quite recent basic research, particularly on the effect of breakwater crest width and permeability on transmitted waves, and on wave forces for vertical structures, are indicated. It is believed that complete analysis of other investigations currently underway will further refine and improve the accuracy of design methods. However, methods in use as described herein have resulted in efficient and economic breakwater structures in this country, and can be considered as adequate for engineering purposes, although subject to further improvement. (Author)

AD-631 553 **See Fld. 4/2**

AD-631 560 **See Fld. 8/13**

AD-631 641 **See Fld. 16/1**

AD-631 671 **See Fld. 13/13**

13/3. CONSTRUCTION EQUIPMENT, MATERIALS AND SUPPLIES

AD-631 529 **See Fld. 18/8**

AD-631 560 **See Fld. 8/13**

AD-631 641 **See Fld. 16/1**

13/4. CONTAINERS AND PACKAGING

AD-631 610 **See Fld. 1/2**

AD-631 641 **See Fld. 16/1**

13/5. COUPLINGS, FASTENERS, AND JOINTS

AD-631 627 **See Fld. 20/11**

13/6. GROUND TRANSPORTATION EQUIPMENT

AD-631 234 **See Fld. 20/11**

AD-631 733 **See Fld. 8/6**

13/7. HYDRAULIC AND PNEUMATIC EQUIPMENT

AD-631 561 Fld. 13/7, 9/2
CFSTI Prices: HC $3.00 MF $0.50
JOHNSON SERVICE CO MILWAUKEE WIS
IMPACT MODULATOR, IMPACT MODULATOR AMPLIFIERS WITH FEEDBACK, AND SYSTEMS APPLICATIONS.
Final rept., 15 May 63-30 Jun 64,
15 Jul 64, 54p. Contract DA-49-186-AMC-28 (X)
Unclassified report

Descriptors: (*Fluid amplifiers, Linear systems), (*Integrators (Computers), Fluid amplifiers), (*Pneumatic devices, Amplifiers), Analog computers, Integrated circuits, Modulators, Jets, Computer logic, Feedback, Fluid flow

The primary objective of this work is to develop and test pure fluid (pneumatic) circuits that per-

form as operational amplifiers and integrators. The active fluid component is the transverse impact modulator. The basic circuit diagram for the operational amplifier is essentially the same as an electronic operational amplifier. The difference being that the pneumatic DC amplifier has a low input impedance which has to be considered in the analysis. Necessary precautions are taken to eliminate the effects of the active elements from closed loop gain, especially at the higher gains. Design curves are presented that allow the closed loop gain to be predicted by the ratio of the summing resistors. Two operational amplifiers in series are used to attain a positive gain package which is used to form a bootstrap integrator. This type of integrator does not require the use of a blocking capacitor, but operates on the principle of critical positive feedback to compensate for the error found in RC filters. When properly adjusted this device performs a true integration. Time did not permit extensive testing of this device, but the results that were obtained were extremely satisfactory. The governing equations are presented which describe the resistance values necessary to obtain desired integration rates. (Author)

AD-631 727 **See Fld. 5/1**

13/8. INDUSTRIAL PROCESSES

AD-631 213 Fld. 13/8, 11/6
CFSTI Prices: HC $1.00 MF $0.50
REDSTONE SCIENTIFIC INFORMATION CENTER REDSTONE ARSENAL ALA
SOME PROBLEMS OF THE WELDING OF TITANIUM AND ITS ALLOYS BY MELTING,
by G. L. Petrov, M. D. Shchipkov, A. I. Lebedev, and A. S. Yazykov. 24 Feb 66, 18p. Rept. no. RSIC-525,
TT 66-61042

Unclassified report

Trans. of mono. Izdatelstvo Nauka, Moscow, 1964 p273-82.

Descriptors: (*Titanium, Welding), (*Titanium alloys, Arc welding), Weldability, Hydrogen, Oxygen, Argon, Deformation, Welds, Welding fluxes, Fractures (Mechanics), Titanium compounds, Hydrides, USSR

An investigation was conducted of the sources of saturation of the seam metal with oxygen and hydrogen during the welding of titanium, the possible redistribution of these gases at the interface of the regions of alpha and beta titanium under the conditions of the welding cycle, and the residual deformations during argon arc welding of titanium alloys. (Author)

AD-631 326 Fld. 13/8, 11/1
CFSTI Prices: HC $2.00 MF $0.50
ARMY WEAPONS COMMAND ROCK ISLAND ILL RESEARCH AND ENGINEERING DIV
EVALUATION OF REMOVABLE FILM CORROSION PREVENTIVES.
Final technical rept. for 1965,
by William F. Garland. Mar 66, 28p. Proj. DA-1C024401A329,
AWC TR-66-774

Unclassified report

Descriptors: (*Corrosion inhibition, Films), (*Adhesive tapes, Corrosion inhibition), Effectiveness, Vinyl plastics, Adhesion, Fungusproofing, Weatherproofing

The report covers the evaluation of some 12 pressure sensitive tapes and one strippable vinyl plastisol material for possible use as a removable film corrosion preventive material. The materials were tested for fungus resistance and adhesion as well as for their ability to protect metals from corrosion and weathering. The tape backings were of three types, i.e., paper, plastic and fabric. All materials were found to be fungus proof and the tapes were tack-free during adhesion testing. A plastic backed tape provided the best combination of protection (accelerated weathering, corrosion and fungus resistance) and ease of removal of any of the tapes tested. A weather resistant polyvinyl fluoride backed tape and the strippable vinyl plastisol were the two most corrosive materials tested. (Author)

AD-631 407 Fld. 13/8, 20/2
CFSTI Prices: HC $4.00 MF $0.75
BIRMINGHAM UNIV (ENGLAND) DEPT OF INDUSTRIAL METALLURGY
RESEARCH ON HOT WORKING OF METALS, WITH PARTICULAR REFERENCE TO MICROSTRUCTURE, MECHANICAL PROPERTIES AND TEXTURE.
Final technical rept., Jan 61-Apr 64,
by I. L. Dillamore, and W. T. Roberts. Apr 64, 114p. Contract AF-EOAR-61-6,

Unclassified report

Descriptors: (*Metals, *Hot working), (*Metallography, Deformation), Microstructure, Mechanical properties, Copper, Thorium, Thorium alloys, Cerium alloys, Crystal structure, Crystal lattices, Nickel, Ytterbium, Rhodium, Platinum, Palladium, Gold, Silver, Copper, Aluminum, Grain size, Twinning (Crystallography), Rolling (Metallurgy), Friction, Temperature, Drawing (Machine processing), Extrusion, Crystal substructure, Symmetry (Crystallography), Crystal lattice defects

The structure and stress-strain behaviour of O.F.H.C. copper deformed at temperatures in the range -196C to 600C, and at two strain rates, 0.005 and 500/sec, were studied. A correlation was made between the structures observed optically and by transmission electron microscopy. At the low strain-rate the deformation processes varied considerably over the temperature range, but at the high strain rate the variation was small. Indications of deformation twinning were found at the high strain rate at temperatures up to 450C. Cross-slip was favored by the high strain-rate. The effect of deformation temperature on the preferred orientation produced by rolling a number of pure f.c.c. metals was studied. Variations in the rolling texture could be related to the ease of cross slip in the metal, and this concept was used to estimate the stacking fault energy of some f.c.c. metals. The rolling textures developed in f.c.c. and b.c.c. metals are explained in terms of realistic stress systems, and the variation in texture through the thickness of rolled sheet is related to rotations of the effective stress system which are governed by friction between the sheet and rolls. (Author)

AD-631 423 Fld. 13/8, 16/4
CFSTI Prices: HC $2.00 MF $0.50
WATERVLIET ARSENAL N Y BENET LABS
APPLICATION OF SHEAR-SPINNING TECHNIQUES IN FORMING MOLYBDENUM MISSILE COMPONENTS.
Technical rept.,
by Charles H. Rose. Mar 66, 29p. Proj. AMC-67408,
WVT 6604

Unclassified report

Descriptors: (*Metal spinning, Guided missile components), (*Nose cones, *Molybdenum alloys), Hemispherical shells, Manufacturing methods, Machining, Thickness

The report covers the development of a spinning process for the manufacture of missile nose tips made of T.Z.M. molybdenum. The design of preforms, tooling and the manufacturing processes are explained. The complete material flow from rough sheet to finished nose tip is described. Results of this effort have shown that shear-spinning is a feasible and practical method of producing hemispherical components from T.Z.M. material, and where a variable wall thickness is required, shear-spinning presents the only feasible method of manufacture. (Author)

AD-631 489 Fld. 13/8, 9/1
CFSTI Prices: HC $1.00 MF $0.50
AEROPROJECTS INC WEST CHESTER PA
ULTRASONIC WELDING PROCESS AND EQUIPMENT FOR CONSTRUCTION OF ELECTRON-TUBE MOUNTS.
Quarterly progress rept. no. 13, 1 Jul-30 Sep 65, by J. G. Thomas. Sep 65, 22p. Contract DA-36-039-sc-86741,

Unclassified report

See also AD-616 908.

Descriptors: (*Welding, *Ultrasonic radiation), (*Electron tubes, Welding), Electron tube parts, Welding rods, Tungsten, Rhenium, Nickel, Molybdenum, Bonding, Wire

Fabrication of the sample lot of 100 type 6080WB electron tubes was completed up to the last step in the assembly sequence. The last step could not be carried out because of a part change. Electrical tests showed that most of the tubes in the sample lot had short circuits. The cause was found to be incorrect assembly prior to welding. Components welding was completed. Welding of 0.003-inch tungsten-rhenium (W-3Re) wire was carried out with a 300-watt welder. Bond strengths of wires welded to nickel and molybdenum sheets were significantly less than the satisfactory strengths obtained previously with a 600-watt welder. Wires could be welded to tungsten sheet with the 300-watt welder, and average tensile-shear strength of the bonds was 26 percent of the wire strength. Frame grid welding was carried out with a 4-kw welder in an attempt to weld all wire turns on one side rod simultaneously. Satisfactory bonding of all wires was not achieved with this approach. (Author)

AD-631 515 Fld. 13/8, 9/1, 20/3, 11/3
CFSTI Prices: HC $2.00 MF $0.50
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J
PREPARATION OF CHEMICAL VAPOR-DEPOSITED MATERIALS FOR USE IN FIELD-ENHANCED ELECTRON EMISSION STUDIES.
Technical rept.,
by David G. McMaster. Mar 66, 44p. Rept. no. ECOM-2681,
Task 1LO-13001-A-91A-33,

Unclassified report

Descriptors: (*Vapor plating, Chemicals), (*Deposition, Chemicals), Field emission, Pyrolytic graphite, Boron compounds, Nitrides, Tungsten, Anisotropy, Films, Temperature, Gas flow, Methane, Sandwich construction

The general principles of chemical vapor deposition (CVD) are described and specific experimental results on the deposition of pyrolytic graphite, of CVD boron nitride, and of CVD tungsten on tungsten substrates are discussed. In order to obtain uniform anisotropic, thin films of pyrolytic graphite and CVD boron nitride, the deposition parameters such as deposition temperature, concentration of the gaseous reactants, and gas flow pattern were varied, and their influence on the deposits was studied. It was found that the uniformity of pyrolytic graphite can be increased by using high total gas flow rates and low methane concentrations. The most uniform CVD-boron nitride deposits were obtained under the following conditions: Temperature: 1600C; Gas flow rate (cc/min): ammonia 10, boron trichloride 6, nitrogen 4. The deposits of pyrolytic graphite and CVD boron nitride exhibited a high degree of anisotropy. Thin-film sandwich structures of pyrolytic graphite and CVD boron nitride were successfully produced. Preliminary tests have been performed with CVD tungsten. (Author)

AD-631 552 Fld. 13/8, 12/1
CFSTI Prices: MF $0.50
ASSISTANT SECRETARY OF DEFENSE (INSTALLATIONS AND LOGISTICS) WASHINGTON D C

FACTORS AND PROCEDURES FOR APPLYING MIL-STD-105D SAMPLING PLANS TO LIFE AND RELIABILITY TESTING.
Technical rept.
21 May 65, 48p. Rept. no. TR-7,
Unclassified report

Availability: Available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.30, as D7.15:7.

Descriptors: (*Quality control, Military requirements), Sampling, Life expectancy, Reliability, Acceptability, Statistical distributions

This report presents a procedure and related tables of factors for adapting the MIL-STD-105D sampling plans to acceptance sampling inspection when the item quality of interest is life length or reliability. Factors are provided for three alternative criteria for lot evaluation; mean life, hazard rate, and reliable life. Inspection of the sample is by attributes with testing truncated at the end of some preassigned period of time. The Weibull distribution, together with the exponential distribution as a special case, is used as the underlying statistical model. (Author)

AD-631 330 See Fld. 9/1

AD-631 364 See Fld. 9/1

AD-631 384 See Fld. 11/5

AD-631 402 See Fld. 9/1

AD-631 422 See Fld. 11/6

AD-631 425 See Fld. 11/2

AD-631 491 See Fld. 9/1

AD-631 578 See Fld. 21/5

AD-631 679 See Fld. 14/2

AD-631 727 See Fld. 5/1

AD-631 755 See Fld. 5/1

13/9. MACHINERY AND TOOLS

AD-631 352 Fld. 13/9, 11/8
CFSTI Prices: HC $1.60 MF $0.50
UNIVERSITAET DES SAARLANDES SAARBRUECKEN (WEST GERMANY)
THEORETICAL ANALYSIS OF THE EFFECT OF VISCOSITY AT HIGH PRESSURE ON ROLLING CONTACT BEARINGS.
Annual summary rept. 1 Feb 59-31 Jan 60,
by Johannes Dorr. 7 Mar 59, 15p. Contract AF 61 (052)-210,
Unclassified report

Descriptors: (*Roller bearings, Stresses), (*Lubrication, Roller bearings), Viscosity, Pressure, Mathematical analysis, Films, Thickness, Deformation, Loading (Mechanics), Differential equations, Integral equations, Nonlinear systems, Wear resistance, Shear stresses, West Germany

AD-631 353 Fld. 13/9, 11/8
CFSTI Prices: HC $3.60 MF $0.50
UNIVERSITAET DES SAARLANDES SAARBRUECKEN (WEST GERMANY) MATHEMATISCHES INSTITUT
THEORETICAL ANALYSIS OF THE EFFECT OF VISCOSITY AT HIGH PRESSURE ON ROLLING CONTACT BEARINGS.
Final technical rept.,
by Johannes Dorr. 14 Mar 62, 38p. Contract AF 61 (052)-210,
Unclassified report

Descriptors: (*Roller bearings, Stresses), (*Lubrication, Roller bearings), Viscosity, Pressure, Mathematical analysis, Films, Thickness, Wear resistance, Shear stresses, Differential equations, Integral equations, Deformation, Iterative methods, West Germany

AD-631 466 See Fld. 1/3

AD-631 646 See Fld. 16/1

13/10. MARINE ENGINEERING

AD-631 260 Fld. 13/10, 14/2, 8/10
CFSTI Prices: HC $2.00 MF $0.50
SCRIPPS INSTITUTION OF OCEANOGRAPHY SAN DIEGO CALIF MARINE PHYSICAL LAB
MPL PARTICIPATION IN SEALAB II,
by Victor C. Anderson, Michael S. Loughridge, and John D. Mudie. 1 Feb 66, 45p. Rept. no. SIO-Ref-66-3
Contract Nonr-2216 (05),
Unclassified report

Descriptors: (*Oceanographic vessels, *Underwater vehicles), (*Laboratories, Underwater), (*Underwater communication systems, Oceanographic vessels), Acoustics, Marine engineering, Site selection, Underwater navigation, Oceanology

This report summarizes the participation of the Marine Physical Laboratory in SEALAB II. It includes the results of the fine-grained, topographic survey of the site, details of and experience with the Benthic Laboratory System, and a summary of shore communication center operations during the program. (Author)

AD-631 267 Fld. 13/10, 8/3
CFSTI Prices: HC $3.00 MF $0.75
NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF
MECHANICS OF RAISING AND LOWERING HEAVY LOADS IN THE DEEP OCEAN: CABLE AND PAYLOAD DYNAMICS.
Technical rept., 1 Nov 64-15 Aug 65,
by P. Holmes. Apr 66, 84p. Rept. no. TR-R-433,
Proj. Y-F015-01-01-001 (b),
Unclassified report

Descriptors: (*Cables (Mechanical), Underwater equipment), (*Dynamics, Cables (Mechanical)), Design, Loading (Mechanics), Oceanographic equipment, Polyethylene plastics, Steel

Based on a theoretical analysis of the cable and payload dynamics during lowering or raising heavy loads in the deep ocean given in Project Trident Technical Report No. 1370863 (AD-418 028), further calculations of the maximum dynamic stresses expected in the lowering cable are presented covering a wide range of cable and payload parameters. The theoretical analysis is adapted to a proposed design procedure, and two typical design examples are given, the results of which are discussed in terms of the safety of the lowering or raising operations. In order to make the design procedure applicable with a greater degree of confidence, it is considered necessary to make measurements of cable tensions and load and ship motions during a full-scale operation to fill in deficiencies of data and provide a basis for verification of theory and calculations. In particular, data are needed on the coefficients of drag and mass, which at this stage must of necessity be estimates. (Author)

AD-631 464 Fld. 13/10, 5/3
CFSTI Prices: HC $4.00 MF $0.75
SCIENCE ENGINEERING ASSOCIATES INC SAN MARINO CALIF
ENGINEERING STUDY ON THE ECONOMICS OF BOAT FLOATS (LOS ANGELES AND SAN DIEGO AREAS).
Final rept.,
by Donald H. Garbaccio, George Zwior, and Basil W. Wilson. Feb 66, 100p. Contract NBy-62190,
NCEL CR-66.003
Unclassified report

Descriptors: (*Floats, Boats), (*Economics, Floats), Costs, Wood, Glass textiles, Steel, Concrete, Piers

It was concluded that the four basic types of boat floats, made of wood, steel pontoons with wood decks, concrete and fiberglass pontoons with wood decks, will have service lives approximating 18, 20, 25 and 30 years respectively. Initial costs of boat floats, standardized to 20 ft. x 60 ft. deck size, in order of magnitude are: wood - $14,402, fiberglass - $20,064, concrete - $20,279, steel - $22,077.

AD-631 681 Fld. 13/10, 11/6
CFSTI Prices: HC $1.10 MF $0.50
DEPARTMENT OF THE NAVY WASHINGTON D C
THE PROSPECTS FOR USING ALUMINUM ALLOYS IN RIVER SHIP CONSTRUCTION,
by G. Efremov. 1966, 6p. Rept. no. Trans-947, TT 66-61118
Unclassified report

Trans. of Rechnoi Transport (USSR) n10 p26-8 Oct 1961.

Descriptors: (*Ships, *Aluminum alloys), (*Boats, Aluminum alloys), Rivers, Tankers, Hydrofoil boats, Cargo ships, Magnesium alloys, USSR

AD-631 780 Fld. 13/10
CFSTI Prices: HC $3.00 MF $0.75
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF NAVAL ARCHITECTURE AND MARINE ENGINEERING
MATHEMATICAL OPTIMIZATION METHODS APPLIED TO SHIP DESIGN,
by Reuven Leopold. Oct 65, 64p. Rept. no. 65-8, Contract NObs-90100, Proj. MIT-DSR-9971,
Unclassified report

Descriptors: (*Ships, Design), (*Optimization, Ships), Cargo ships, Search theory, Mathematical models, Dynamic programming, Costs, Standards

Various existing mathematical models of functional optimization and optimization criteria were examined for application to the ship design problem. Based on the study, the Exponential Random Search technique in conjunction with 'Multiple Parameter Weighting Criteria' were used in a sample design study of a cargo ship. Results of the study show that this approach to the ship design problem: (1) yields better results than any other method available at the present time; (2) arrives at a solution in less time than current methods; (3) is more versatile than any other method available; (4) performs the optimization more correctly because it does not neglect any of the features of the problem of optimizing a function of several variables. The demonstrated flexibility, versatility, and efficiency of the chosen method constitute in the author's opinion, a powerful tool in the preliminary design of ships. (Author)

AD-631 320 See Fld. 11/12

AD-631 328 See Fld. 17/1

AD-631 346 See Fld. 20/3

AD-631 684 See Fld. 18/6

AD-631 738 See Fld. 18/6

13/11. PUMPS, FILTERS, PIPES, TUBING AND VALVES

AD-631 702 Fld. 13/11, 21/4
CFSTI Prices: HC $4.60 MF $0.50
ARMY ENGINEER RESEARCH AND DEVELOPMENT LABS FORT BELVOIR VA PETROLEUM EQUIPMENT DIV
DESIGN, DEVELOPMENT, TEST, AND EVALUATION OF A 50-GPM OPTIMUM LIGHTWEIGHT FILTER/ SEPARATOR.
Final rept., Jul 64-Oct 65,
by George A. Gariepy. Mar 66, 44p. Proj. DA-1M643324D592, Task 1M643324D59209, ERDL 1848
Unclassified report

Descriptors: (*Petroleum, Decontamination), (*Fuel filters, Effectiveness), Fuel pumps, Pumps, Filters (Fluid), Design, Tests, Solids, Water, Separation, Storage, Handling, Specifications

The report covers design, development, test, and evaluation of a 50-gpm optimum, lightweight filter/separator for primary application with 50-gpm standard Military bulk transfer pumps. A preliminary design was prepared, and a contract was awarded for fabrication of a prototype model. Test and evaluation of this unit indicated the preliminary design was satisfactory. Therefore, six developmental test models were procured and subjected to the comprehensive evaluations necessary to determine conformance to the water- and solids-removal performance requirements of Military Specification MIL-F-8901A. In addition, rail impact and rough handling tests were conducted. The report concludes: (1) The 50-gpm optimum, lightweight filter/separator, when tested under conditions specified in MIL-F-8901A, meets all established waterand solids-removal performance requirements. (2) All requirements of the Small Development Requirement (SDR) are met except the requirement for incorporation of the 'Go-No Go' gage device. (3) The filter/separator, without further modification, is suitable for integrated engineering and service tests. (Author)

13/12. SAFETY ENGINEERING

AD-631 714 Fld. 13/12, 2/6
CFSTI Prices: HC $2.00 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
WHAT BASIC FIRE RESEARCH CAN LEARN FROM FOREST FIRES,
by W. G. Berl. 24 Oct 63, 35p. Rept. no. TG-538,
Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Forest fires, Physical properties), Flames, Burning rate, Fuels, Smokes, Heat, Chemical reactions, Ignition, Inhibition

Topics include: burning rates, ignition, suppression and plumes.

AD-631 483 **See Fld. 6/20**

13/13. STRUCTURAL ENGINEERING

AD-631 369 Fld. 13/13, 8/13
CFSTI Prices: HC $7.60 MF $0.75
MICHIGAN UNIV ANN ARBOR
TRANSIENT LOADING TESTS ON A RIGID CIRCULAR FOOTING.
Final rept.,
by V. P. Drnevich, J. R. Hall Jr., and F. E. Richart Jr.. Feb 66, 71p. Contract DA-22-079-eng-340, Task NWER-13.009,
AEWES CR-3-146
Unclassified report

Descriptors: (*Foundations (Structures), *Soil mechanics), Sand, Loading (Mechanics), Dynamics, Compressive properties, Theory, Experimental data

This report presents data obtained from transient loading tests on a one-foot-diameter relatively rigid footing resting on the surface of a bed of sand. Results are presented showing the load applied to the footing and the resulting acceleration of the footing. Two types of load pulses were applied to the footing, having rise times of approximately 4 msec and 20 msec. The magnitude of the loads was such that the response of the footing was essentially elastic. This allowed a direct comparison to the theory for the response of a footing resting on an elastic half space acted upon by a transient load. The mass of the footing was varied to produce different footing response characteristics. The results of the tests show that the theory leads to a reasonable prediction of the response of the of the footing to transient loads. The critical part of the analysis is the procedure for evaluating the effective shear modulus of the soil under the footing for the range of deformations to be encountered. A brief description of the application of the phase plane method of analysis to the footings subjected to transient loads is given. This is shown to be applicable to footings subjected to loads causing permanent deformation as well as elastic deformations. (Author)

AD-631 406 Fld. 13/13, 11/7, 22/2
CFSTI Prices: HC $11.00 MF $3.25
AIR FORCE AERO PROPULSION LAB WRIGHT-PATTERSON AFB OHIO
AEROSPACE EXPANDABLE STRUCTURES CONFERENCE (2ND), 25, 26 AND 27 MAY 1965.
27 May 65, 803p. Rept. no. AFAPL-TR-65-108,
Unclassified report

Prepared in cooperation with Archer Daniels Midland Co., Minneapolis, Minn.

Descriptors: (*Expandable structures, *Symposia), (*Aerospace craft, Expandable structures), Spacecraft, Reentry vehicles, Honeycomb cores, Sandwich construction, Plastics, Shelters, Expanded plastics, Solar collectors, Hangars, Reflectors, Communication satellites (Passive), Gliders, Microwave communication systems, Sodium compounds, Silicates, Thermal radiation, Shielding, Coatings, Meteors, Metallic textiles, Simulation, Inflatable structures, Cylindrical bodies, Wires, Films, Beams (Structural), Aluminum, Foils, Structural shells, Astronauts, Life support, Coatings, Textiles, Heat-resistant materials, Space stations, Antennas

The report is based upon the discussions at the Conference held at the Lafayette Club, Minnetonka Beach, Minnesota. The subject matter has been arranged in six sessions in the order of presentation at the conference, followed by six papers which were not given at the conference. (Author)

AD-631 420 Fld. 13/13, 13/1
CFSTI Prices: HC $11.60 MF $0.75
PANERO (GUY B) INC NEW YORK
VENTILATION TESTS OF FALLOUT SHELTER SPACES IN NEW YORK CITY AND VICINITY.
Final rept.,
by Michael A. Combe, David B. Nelson, and John C. Tomcala. Feb 66, 115p. Proj. 1200, Task 1210,
Unclassified report

Descriptors: (*Fallout shelters, *Ventilation), Urban areas, New York, Underground structures, Buildings, Models (Simulations), Heat exchangers, Temperature, Heat transfer, Cooling + ventilating equipment

Natural and forced ventilation tests were conducted during 1964 at eight shelter sites. Included were: three (summer) tests in high-rise building core areas; two (summer) tests in public school corridors and basements; one (summer) test in a home basement; one (summer) test in a buried community shelter; one (winter) test in a buried private shelter. Using electro-mechanical 'Simocs' to simulate shelter occupancy, the resulting physical environment was measured and analyzed. Manual ventilation devices and water-cooled heat exchangers were developed and tested to determine their ability to provide a more tolerable shelter environment. Formulas for predicting shelter ventilation and temperatures are discussed. Methods for improving ventilation rate are suggested. The report concludes that effective temperature (ET) in naturally ventilated above-ground shelters (loading: one person/10 sq. ft.) will not exceed 85F with outside air at N.Y.C. 15% summer design level. In naturally ventilated buried or semi-buried shelters (one person/10 sq. ft.), ET may exceed 85F at same design level. During normal winter weather (Conn.), naturally ventilated underground shelters with efficient heat sinks will have uncomfortably low ET (40F-50F), if loaded with fewer than one person/10 sq. ft. Radiant reflective insulating paper is found to increase ET by 10-15F while preserving the heat sink. (Author)

AD-631 424 Fld. 13/13
CFSTI Prices: HC $7.95 MF $2.25
IIT RESEARCH INST CHICAGO ILL TECHNOLOGY CENTER
AN INVESTIGATION OF MINIMAL EQUIPMENT NEEDS IN PERSONNEL SHELTERS.
Final rept.,
by John A. Havers, Claire B. Monk Jr., and Erich H. Koeller. Jun 65, 496p. Contract OCD-PS-64-50, Proj. 1200, IITRI-M6064 (4) Task 1210,
Unclassified report

Descriptors: (*Fallout shelters, Design), Optimization, Civil defense systems, Performance (Engineering), Personnel, Cooling + ventilating equipment, Costs, Systems engineering, Explosion effects, Physiology, Sanitary engineering

The investigation of Minimal Equipment Needs included an examination of the performance requirements for shelter equipment systems, considering these in relation to the attack-induced environmental factors and to the anticipated conditions of shelter occupancy. With these performance requirements once established, suitable equipment systems are then identified. Here a major emphasis is placed upon the minimization of equipment needs, as dictated by the research concept of the 'austere' shelter. Finally, for illustrative purposes, equipment systems are described for the three shelter sizes and for four identified climatic regions. Approximate estimates of equipment costs are included.

AD-631 442 Fld. 13/13
CFSTI Prices: HC $1.00 MF $0.50
IIT RESEARCH INST CHICAGO ILL TECHNOLOGY CENTER
AN INVESTIGATION OF MINIMAL EQUIPMENT NEEDS IN PERSONNEL SHELTERS.
Final rept.,
by John A. Havers, Claire B. Monk Jr., and Erich H. Koeller. Jun 65, 7p. Contract OCD-PS-64-50, Proj. IITRI-M6064 (4)
Unclassified report

See also AD-631 424.

Descriptors: (*Fallout shelters, Design), Civil defense systems, Survival, Explosion effects, Physiology, Sanitary engineering, Hazards, Cooling + ventilating equipment

AD-631 475 Fld. 13/13, 13/1
CFSTI Prices: HC $1.10 MF $0.50
PANERO (GUY B) INC NEW YORK
VENTILATION TESTS OF FALLOUT SHELTER SPACES IN NEW YORK CITY AND VICINITY.
Summary of final rept.
Feb 66, 4p.
Unclassified report

Subcontracted to Stanford Research Inst., Menlo Park, Calif. See also AD-631 420.

Descriptors: (*Fallout shelters, *Ventilation), Urban areas, New York, Cooling + ventilating equipment, Buildings, Underground structures, Models (Simulations)

A summary is given of fallout shelters in New York City under the following subheadings: core areas within above -ground buildings, buried and semi-buried shelters, and manual ventilation devices.

AD-631 501 Fld. 13/13, 20/11
CFSTI Prices: HC $4.00 MF $1.00
ILLINOIS UNIV URBANA DEPT OF CIVIL ENGINEERING
INTERACTION OF PLANE STRESS WAVES WITH A SPHERICAL CAVITY IN ELASTIC AND VISCOELASTIC MEDIA.
Technical rept.,
by D. E. Allen, and A. R. Robinson. Feb 66, 135p. Rept. no. Structural Research Ser-302, Contract Nonr-1834 (03), Proj. NR-064-183,
Unclassified report

Descriptors: (*Mechanical waves, Propagation), (*Rock (Geology), Stresses), Elasticity, Viscoelasticity, Potential theory, Numerical analysis, Structures

Methods are given for the determination of stresses in the vicinity of a spherical cavity in an unbounded elastic or viscoelastic medium as a result of a step wave engulfing the cavity. Incident longitudinal and shear waves are considered. Two approaches are used for the solution. In the first, the solution is expressed in terms of generating functions which are determined from the boundary conditions at the cavity wall. For the elastic case, this method is analogous to the d'Alembert solution in one-dimensional wave propagation in which the general solution of the wave equation is used. The elastic case requires the solution of coupled systems of ordinary differential equations of initial value type. In the viscoelastic case, these are replaced by systems of integro-differential equations of Volterra type. Numerical methods are used for the solution of the equations. The second method proceeds by finding the Laplace transforms of the desired stresses and performing the inversions numerically. Viscoelastic materials represented by the Maxwell model and the standard linear model have been used for the computations presented. On the basis of these computations, conclusions are drawn concerning the effect of viscoelasticity of rock on the dynamic stress concentrations around a cavity in the rock making use of properties of rock determined for low stress levels. (Author)

AD-631 555 Fld. 13/13
CFSTI Prices: HC $4.00 MF $1.00
WASHINGTON UNIV SEATTLE DEPT OF AERONAUTICS AND ASTRONAUTICS
OPTIMUM DEPTH - MINIMUM AREA DESIGN CHARTS FOR LATERALLY SUPPORTED STRUCTURAL BEAMS IN PURE BENDING.
Master's thesis,
by Peter St. Clair Christie. 9 Dec 65, 146p.
Unclassified report

Descriptors: (*Beams (Structural), Design), Weight, Optimization, Stresses, Loading (Mechanics), Bending, Supports, Web beams, Tensile properties, Deflection

The investigation attempts to establish 'minimum' weight beam proportions, based on beam web elastic buckling criteria, for unstiffened I beams in pure bending. The investigation is basically a study of the parameters affecting beam weight for both strength and deflection designed beams. It is shown that an 'optimum' beam depth exists at which the beam cross sectional area will be 'minimum' for both strength designed and deflection designed beams. Design charts are prepared which enable the beam designer to select the lightest weight beam depth for the design moment load and for the design stress level that the beam can sustain.

AD-631 632 Fld. 13/13
CFSTI Prices: HC $5.00 MF $1.00
SOUTHWEST RESEARCH INST SAN ANTONIO TEX
INVESTIGATION OF STIFFENED STEEL PLATES.
Final rept.,
by Thein Wah. 9 Apr 66, 186p. Contract Nobs-92130, Proj. SwRI-03-1664,
Unclassified report

Descriptors: (*Metal plates, Structural properties), (*Steel, Metal plates), Beams (Structural), Elasticity, Plasticity, Stresses, Strain (Mechanics), Deflection

The report covers the results of uniform pressure tests on six steel plates stiffened by beams. The stiffened plates were loaded in steps into the plastic range. Simple formulas are devised to describe the behavior of the system. A detailed study of the strain and stress distributions obtained experimentally resulted in the following major conclusions: By purely theoretical analysis, it is not possible to obtain a detailed picture of the stress distribution in the stiffeners and the plate. A good estimate of the 'collapse' pressure and deflections of the stiffeners may still be obtained by using equations. The stiffened plate of the proportions tested behaves very much like a fixed-ended beam made up of a stiffener section plus an effective width of plate equal to the spacing between stiffeners, carrying a load per unit length equal to the applied pressure times the effective width, with certain modifications. The weakest part of the plate stiffener combination is the stiffener. The stiffener forms a hinge at the supports and at the centerline while by far the greater portion of the plate itself is within the elastic range. The permanent set or 'residual deflection' is greatly affected by welding distortion and is dependent on the size of plating used. (Author)

AD-631 671 Fld. 13/13, 13/2
CFSTI Prices: HC $5.00 MF $1.00
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CIVIL ENGINEERING
PRESSURE DISTRIBUTION ON UNDERGROUND STRUCTURAL CYLINDERS.
Rept. for 1 Mar 64-2 Apr 65,
by Kaare Hoeg. Apr 66, 157p. Contract AF 29 (601)-6368, Proj. AF-5710, Task 13.157, AFWL TR-65-98
Unclassified report

Descriptors: (*Underground structures, Cylindrical bodies), (*Pressure, Underground structures), Soil mechanics, Experimental data, Mathematical analysis

The objective of this study was to investigate the magnitude and distribution of radial contact pressures on a horizontally buried structural cylinder under the action of a uniform static overpressure applied on the soil surface. A computational procedure was developed for predicting these contact pressures and a parallel experimental phase, which constituted the major effort in this study, was conducted. The tests were designed to measure directly the radial pressure on the cylinder interface. The primary variables investigated were cylinder flexibility, cylinder compressibility, depth of sand cover, and magnitude of applied surface pressure. The approach taken in the analytical phase was to analyze an idealized representation of the soil-structure system by a closed mathematical formulation which assumed the soil to behave like a continuous, elastic medium. Simple modifications of the mathematical model were introduced to make it more realistically represent a structural cylinder buried in soil. The final distribution of stresses and displacements was computed in a step-wise linear fashion over the pressure range to account for the nonlinear stress-strain relationship for sand. The experimental and analytical results were compared to each other and to previous semi-empirical recommendations for the design of underground structures. It was concluded that the analytical formulation provides an extremely useful approach to the design of underground structural cylinders in general. (Author)

AD-631 783 Fld. 13/13
CFSTI Prices: HC $2.00 MF $0.50
MARINE CORPS LANDING FORCE DEVELOPMENT CENTER QUANTICO VA
INTERIM INSTRUCTIONS FOR INSTALLATION OF EAW-20 EXTENDIBLE EARTH ANCHOR SYSTEM.
Landing Force Information Letter no. 21.
19 Apr 66, 31p. Proj. 51-58-01B
Unclassified report

Descriptors: (*Anchors (Structural), Installation), Extendable structures, Maintenance, Charges (Explosive), Grout, Landing fields, Instruction manuals

The instructions present information on the installation and maintenance of the EAW-20 Extendible Earth Anchor System and its associated equipment. Although versatile in its many possible practicable applications, the anchor information given is tailored primarily for the Short Airfield for Tactical Support (SATS) application for which the anchor was initially designed. It consists of the same three primary components as the EAW-20 Earth Anchor: anchor tube assembly, explosive cartridge, and grout. Each of these components has been redesigned to give the new system increased flexibility, safety, and reliability.

AD-631 397 See Fld. 1/3

AD-631 519 See Fld. 13/2

AD-631 641 See Fld. 16/1

AD-631 648 See Fld. 20/11

AD-631 654 See Fld. 20/11

AD-631 773 See Fld. 20/11

Field 14-METHODS AND EQUIPMENT

14/1. COST EFFECTIVENESS

AD-631 259 See Fld. 9/2

14/2. LABORATORIES, TEST FACILITIES, AND TEST EQUIPMENT

AD-631 327 Fld. 14/2, 19/4
CFSTI Prices: HC $1.00 MF $0.50
NAVAL ORDNANCE LAβ WHITE OAK MD EXPLOSION DYNAMICS DIV
EXPLOSIVE OPENING OF A METAL DIAPHRAGM,
by E. Eugene Kilmer. 10 Mar 66, 16p. Task NOL-897/AF, NOLTR 65-204
Unclassified report

Descriptors: (*Diaphragms (Mechanics), Rupture), (*Shock tubes, Diaphragms (Mechanics)), (*Explosion effects, Rupture), Shock waves, Valves, Aluminum, Steel, Feasibility studies

The feasibility of using explosively opened aluminum and steel diaphragms to release the cold driver gas in the Shock Interaction Range was investigated. Diaphragms opened by extruded explosives were found feasible and a reliable system was developed for this application. (Author)

AD-631 342 Fld. 14/2, 20/11
CFSTI Prices: HC $3.00 MF $0.50
RENSSELAER POLYTECHNIC INST TROY N Y DEPT OF MECHANICS
SURFACE TEMPERATURES AT SLIDING INTERFACES IN VACUA AND METAL ADHESION.
Technical documentary rept., 15 Nov 63-15 Feb 64,
by F. F. Ling. Mar 64, 58p. Contract AF 33 (657)-10058, Proj. AF-7342, Task 734204, AFML TDR-64-97

Unclassified report

Descriptors: (*Friction, Surface temperatures), (*Adhesion, Surface temperatures), (*Test equipment, Friction), Vacuum, Magnetic fields, Loading (Mechanics), Heat of activation, Wear resistance, Theory, Welding, Metals

A friction and wear apparatus is described for use in vacua which has no supporting bearings other than the sliding surfaces whose friction and wear characteristics are to be investigated. The moving specimen is suspended and rotated magnetically, external to a vacuum chamber enclosing the test section. Typical temperature, friction and wear data are shown. Moreover, a mechanism of metal adhesion is postulated and a formula on the coefficient of adhesion derived. The experimental equipment to confirm the validity of the theory, at least phenomenologically, is described. The experimental equipment permits loading of predetermined amounts under varied temperatures and durations in vacua; the force of separation is then measured. The simple theory indicates the parameters of the problem: contact load, duration of loading, temperature at the interface, and 'cleanliness' of the interface. The last item is measured through two quantities: (a) a reduced activation energy; and (b) a reduced time exponent of the process. The relationship between adhesion and friction is discussed. (Author)

AD-631 468 Fld. 14/2
CFSTI Prices: HC $2.00 MF $0.50
OHIO STATE UNIV COLUMBUS AERONAUTICAL AND ASTRONAUTICAL RESEARCH LABS
AN EXPERIMENTAL INVESTIGATION OF THE USE OF NITROUS OXIDE IN HYPERSONIC WIND TUNNEL TESTING FACILITIES.
Interim scientific rept.,
by J. R. Nicholson, E. S. Fishburne, and R. Edse. Jan 66, 28p. Rept. no. TR-5, Contract AF 33 (657)-8951, Proj. AF-7065, ARL 66-0011

Unclassified report

Descriptors: (*Hypersonic wind tunnels, Heating), (*Heat of reaction, Nitrogen compounds), (*Heaters, Hypersonic wind tunnels), Oxides, Decomposition, Enthalpy, Atmosphere entry, Aerodynamic heating, Simulation, Test facilities, Feasibility studies

Various continuous flow hypersonic wind-tunnel testing facilities are discussed in general and the possibility of employing the exothermic decomposition of nitrous oxide to generate high temperature air is considered in detail. The feasibility of establishing high enthalpy air streams by mixing preheated nitrous oxide with a hot stream of nitrogen which was heated separately to temperatures ranging from 1033K to 1264K was investigated experimentally. The temperatures of the pre-heated nitrous oxide ranged from 875K to 1055K. After the decomposition of the nitrous oxide the gas mixture attained temperatures between 859K and 1807K. When the decomposition process was incomplete the reacted gas contained a substantial quantity of nitrogen dioxide and nitrogen tetroxide. On the other hand only about 1% of these products was formed when the reaction went to completion. The highest temperature of the reacted products amounted to 1807K which indicates that nearly 80% of the theoretical temperature rise was obtained. (Author)

AD-631 479 Fld. 14/2
CFSTI Prices: HC $2.00 MF $0.50
CASE INST OF TECH CLEVELAND OHIO
DEEP LAB CONFERENCE, OCTOBER 12, 1965, CORNER HOUSE, RAND MINES, JOHANNESBURG, SOUTH AFRICA,
by Frederick Reines. 12 Oct 65, 41p. Contract Nonr (G)-00034-65,

Unclassified report

Descriptors: (*Symposia, Nuclear physics laboratories), (*Nuclear physics laboratories, Site selection), Underground structures, Scientific research, Neutrinos, Cosmic rays, Union of South Africa

The usefulness to neutrino and cosmic ray research of a very deep underground laboratory housed in a spherical cavity 100 feet in diameter and 15,000 feet below the surface is described. It appears from this meeting that the two major problems in providing such a location, i.e. temperature and mechanical strength, can be solved within existing technology. Various locations in the United States and South Africa which seem most suitable for such a laboratory were mentioned and the merits of locating below an existing mine, e.g. Anglo-American's Western Deep Levels west of Johannesburg, were discussed. The estimated cost of the laboratory ranged from 4 to 40 million dollars and the time for construction ranged from under two to eight years, depending on the location. (Author)

AD-631 496 Fld. 14/2, 19/3
CFSTI Prices: HC $3.00 MF $0.75
ENGINEERING-PHYSICS CO ROCKVILLE MD
PARTICLE VELOCIMETER FOR USE CLOSE-IN TO UNDERGROUND EXPLOSIONS.
Formal rept., phase 4,
by William L. Danek Jr., and Algimantas A. Dargis. 31 Dec 65, 93p. Contract DA-49-146-XZ-224, Proj. EPCO-114, DASA 1431-2

Unclassified report

See also AD-610 676.

Descriptors: (*Measuring devices (Electrical and electronic), Underground explosions), (*Underground explosions, Measuring devices (Electrical and electronic)), Shock waves, Magnetic properties, Magnetic fields, Instrumentation, Design, Deformation, Circuits, Recording systems, Inductance, Signal-to-noise ratio, Nuclear explosions

Phase IV has consisted of designing a power supply to provide the high currents required and incorporating the power supply into the gage body, examining methods of increasing the signal gain of the velocimeter in order that the practical measurement range of the gage in field use may be extended down to velocities of tens of meters per second, determining the most suitable data recording method for use with the gage in the field, and improving the shock velocity generator utilized in laboratory tests. This report describes these Phase IV activities in their detail.

AD-631 498 Fld. 14/2, 8/2
CFSTI Prices: HC $7.60 MF $0.75
ARMY ENGINEER GEODESY INTELLIGENCE AND MAPPING RESEARCH AND DEVELOPMENT AGENCY FORT BELVOIR VA
ELECTRONIC RANGING EQUIPMENT (MINIATURIZED TELLUROMETER MRA-3).
Engineering test rept., draft,
by Robert S. Fishbough. 26 Jun 61, 79p. Proj. 8T35-10-001-06,

Unclassified report

Rept. on Utilization of Ground Surveying Electronic Equipment for Mapping.

Descriptors: (*Range finding, *Miniature electronic equipment), (*Distance-measuring equipment, Performance (Engineering)), Military requirements, Surveying, Mapping

This report covers the engineering test of the Miniaturized Tellurometer. The tests were conducted for the purpose of determining the suitability of the item for the Corps of Engineers and Army use. This report concludes that the miniaturized tellurometer meets both the objective and the military characteristics of the project card except as noted. The miniaturized tellurometer is capable of yielding accurate measurements over distances of from 100 meters to at least 40 kilometers during all weather conditions both day and night. The miniaturized tellurometer is capable of measuring distances under adverse weather conditions over rugged terrain with considerably less time and personnel than is possible using conventional taping methods. The miniaturized tellurometer is suitable for the measurement of baselines, traverse and trilateration surveys conducted by the Corps of Engineers and Field Army. (Author)

AD-631 639 Fld. 14/2
CFSTI Prices: HC $1.10 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
OPERATION AND MAINTENANCE HAZARDOUS CIRCUIT TESTER TYPE 0-2.
19 Dec 60, 11p. Rept. no. TG-469, Contract NOrd-7386,

Unclassified report

See also AD-631 644.

Descriptors: (*Ohmmeters, *Circuit testers), Instruction manuals

The Hazardous Circuit Tester, Type 0-2, is an instrument designed specifically for measuring the resistance of electrically fired igniters in fuzes, squibs and detonators without damaging or accidentally firing them during live test operations. This is accomplished by limiting the energy in the actual test circuit to a maximum of ten microwatts. The operation of the Type 0-2 differs little from that of any conventional ohmmeter. Designed for ordnance testing, it has only two controls, an On-Off Switch and a Zero-Adjust knob. Two connectors, marked 10 Ohms and 100 Ohms provide for the selection of its two ranges. (Author)

AD-631 644 Fld. 14/2
CFSTI Prices: HC $2.60 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
A SYSTEM FOR CHECKING HAZARDOUS ELECTRIC CIRCUITS,
by Robert E. Kemelhor. 28 Jun 60, 22p. Rept. no. TG-467, Contract NOrd-7386,

Unclassified report

See also AD-631 639.

Descriptors: (*Ohmmeters, *Circuit testers), (*Measuring devices (Electrical + electronic), Circuit testers), Explosive actuators, Explosives initiators

The hazardous circuit ohmmeter and continuity measuring device described make possible a safe, simple method for testing bridge-wire circuits and other ordnance control circuits without the danger of inadvertently actuating or firing the devices. The principle used in both the ohmmeter and the continuity meter is the utilization of the energy output of a photocell which even at light saturation is well below the minimum firing currents. Prototype meters have been built and successfully tested for safety and performance. First production run on the ohmmeter version has been initiated for use in the Polaris program. (Author)

AD-631 647 Fld. 14/2, 20/4
CFSTI Prices: HC $3.60 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB

A PRELIMINARY STUDY OF SHOCK-DUCT DIFFUSERS IN A HYPERSONIC HELIUM TUNNEL,
by R. A. Makofski, and S. N. Rea. Jan 63, 35p.
Rept. no. TG-461,
Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Hypersonic wind tunnels, *Diffusers), Shock waves, Helium, Wind tunnel nozzles, Pressure, Pitot tubes, Reynolds number, Ducts

Tests of a fixed geometry shock-duct diffuser were conducted using helium at supply pressures from 400 to 1000 psia and Mach numbers from 16 to 18. The tests were made in a blow-down tunnel having a 12-degree conical nozzle with a 2-inch exit diameter. Pitot pressures were measured in the test section and at the diffuser exit. These studies have shown that this type of diffuser could provide a pressure recovery equivalent to test section pitot pressure. Furthermore, the pressure recovery was found to be dependent upon the diffuser inlet angle and Reynolds number and only weakly dependent upon the shock-duct diameter. Values of diffuser efficiency of 53 per cent were obtained. (Author)

AD-631 665 Fld. 14/2
CFSTI Prices: HC $1.00 MF $0.50
TRAINING CENTER FOR EXPERIMENTAL AERODYNAMICS RHODE-SAINT-GENESE (BELGIUM)
LOW DENSITY HIGH TEMPERATURE DYNAMICS.
Annual summary rept. 1 Oct 62-30 Sep 63,
by J. J. Smolderen. Nov 63, 20p. Contract AF-EOAR-41-63,
Unclassified report

Descriptors: (*Hypersonic wind tunnels, Tests), Calibration Jets, Density, Orifices, Pressure, Instrumentation, Gears, Pumps, Tanks (Containers), Vacuum apparatus, High-temperature research, Belgium

A low density continuous hypersonic wind tunnel was built and acceptance and preliminary calibration tests were completed. The first runs were made using a free jet, exhausting from a circular sonic orifice, with stagnation pressure in the range from 40 to 150 microns Hg. The test chamber pressure varied between 1, 5 and 6 microns Hg in these tests. No heater was used. A rather complete set of pressure measuring equipment was used in these tests, as well as a simple, axial traverse mechanism. Design of more advanced instrumentation and construction of a two degrees of freedom traversing gear are in progress. Performance and characteristics of the pumping system and vacuum tank of the wind tunnel are discussed.

AD-631 679 Fld. 14/2, 11/6, 13/8
CFSTI Prices: HC $3.00 MF $0.75
SOUTHWEST RESEARCH INST SAN ANTONIO TEX DEPT OF INSTRUMENTATION RESEARCH
NONDESTRUCTIVE EVALUATION OF METAL FATIGUE.
Scientific rept., 1965-1966,
by Felix N. Kusenberger, Byron E. Leonard, Richard L. Pasley, John R. Barton, and W. Lyle Donaldson. Mar 66, 92p. Rept. no. 15-1688-1,
Contract AF 49 (638)-1502, Proj. AF-9782,
Task 978201,
AFOSR 66-0648
Unclassified report

Descriptors: (*Metals, Fatigue (Mechanics)), (*Non-destructive testing, Metals), (*Ultrasonic radiation, Non-destructive radiation), X-ray diffraction analysis, Magnetic fields, Test methods, Fracture (Mechanics), Steel aluminum, Aluminum alloys

Studies were conducted to improve and evaluate existing ultrasonic Rayleigh wave and magnetic perturbation equipment for the detection of fatigue damage in aluminum and steel stress cycled specimens. Ultrasonic results obtained from a 7075-T6 aluminum specimen stress cycled in direct uniaxial tension are presented; these include reproductions of Polaroid photographs of signal patterns and photomicrographs of the specimen surface showing the small fatigue crack detected. The recent results are compared with those of the previous program to indicate the improvement in resolution. On steel stress cycled specimens, both ultrasonic and magnetic technique results are presented including reproductions of typical data. These recent results are also compared with previous findings to establish the improvement in resolution. In addition, the fatigue detection results are compared with recent ones reported by other workers. Experimental investigations to determine the refraction properties of surface waves in laboratory size metallic specimens are described and the results discussed. These studies were conducted to obtain evidence that Rayleigh waves can be focused. (Author)

AD-631 695 Fld. 14/2, 1/5, 17/7
CFSTI Prices: HC $2.00 MF $0.50
NAVAL AIR ENGINEERING LAB (SHIP INSTALLATIONS) PHILADELPHIA PA ENGINEERING DEPT
FIXTURE FOR TESTING ABILITY OF INSET RUNWAY GUIDE LIGHTS TO WITHSTAND AIRCRAFT LANDING GEAR LOADS.
Final rept.,
by G. M. Henig, and W. J. Biebel. Mar 66, 41p.
Rept. no. NAEL-ENG-7373,
Proj. FA-430-204-01E
SRDS RD-66-17
Unclassified report

Descriptors: (*Runways, *Marker lights), Airports, Lighting equipment, Trafficability, Aircraft landings, Impact shock, Shock resistance, Loading (Mechanics), Test equipment, Test methods

This report contains design data, design parameters, suggested test methods, structural analysis, and suggested additional test functions of a fixture which will test load capabilities of inset runway guide lights. (Author)

AD-631 771 Fld. 14/2, 20/14
CFSTI Prices: HC $1.60 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
SULZER MODEL 5 PRECISION PORTABLE CLOCK: MEASUREMENT OF RADIO FREQUENCY SIGNALS RADIATED,
by G. S. Hartong. Nov 62, 17p. Rept. no. TG-454,
Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Clocks, *Electromagnetic compatibility), Radiofrequency, Time signals, Radiofrequency interference, Aircraft equipment, Navigation, Test equipment (Electronics), Portable, Timing devices, Aviation safety, Low frequency, High frequency, Very high frequency

It is proposed to hand carry the Sulzer Model 5 Precision Portable Clock aboard Commercial Airlines for the purpose of transferring time quickly from one location to another. This report is issued to show that this piece of equipment will not be a hazard to the operation of the aircraft or interfere in any way with the radio or navigation equipment aboard. Tables contain a complete list of all frequencies between 150 kc and 100 mc and their levels in the test set where radio frequency radiation was discovered. A comparison between the measured levels, the limits that apply to United States Airforce equipment, and the sensitivity of the test equipment is illustrated. Two photographs show the outward physical appearance of the equipment while the other shows the test set-up arrangement.

AD-631 775 Fld. 14/2, 20/13
TECHNION - ISRAEL INST OF TECH HAIFA
CALIBRATION OF THIN FILM RESISTANCE THERMOMETERS FOR HEAT FLUX MEASUREMENTS IN THE SHOCK TUBE,
by A. Seginer, A. Cohen, and J. Rom. 15 Dec 64, 6p. Contract AF 61 (052)-576,
Unclassified report

Availability: Published in Israel Journal of Technology v3 n1 p25-30 1965. Copies to DDC users only.

Descriptors: (*Resistance thermometers, Calibration), (*Heat flux, Measurement), Films, Metal films, Shock tubes, Circuits, Analog systems, Heat sinks, Voltage, Heat transfer, Israel

An electronic circuit is devised for the determination of the calibration parameter of a thin film resistance thermometer. This circuit is then used to calibrate an analog network which transfers a voltage proportional to instantaneous surface temperature of the thin film gage, in a shock tube application, into a voltage proportional to the heat flux. (Author)

AD-631 821 Fld. 14/2, 20/13, 20/4
CFSTI Prices: HC $1.00 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
MEASUREMENT OF HEAT TRANSFER AT NOZZLE THROAT BY IMBEDDED PYROMETER METHOD,
by S. A. Elder, and F. K. Hill. Jan 64, 18p. Rept. no. TG-552,
Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Hypersonic wind tunnels, Heat transfer), (*Wind tunnel nozzles, *Heat transfer), (*Radiation pyrometers, Operation), Nozzle throats, Temperature, Rocket motors (Solid propellant), Exhaust gases, Concentration (Chemistry), Spectrum (Infrared), Boundary layer, Molybdenum

A newly developed transistorized radiation pyrometer was employed in temperature and heat transfer studies of the nozzle of a rocket exhaust powered Mach 5 hypersonic wind tunnel. The investigation also involved boundary layer measurements and spectroscopic determination of gas species concentration.

AD-631 823 Fld. 14/2
CFSTI Prices: HC $3.00 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
SPECIALIZED LABORATORIES IN SUPPORT OF THE TECHNICAL OPERATIONS AT APL.
Dec 64, 51p. Rept. no. TG-551,
Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Physics laboratories, Maryland), Florida, Propulsion, Guided missile ranges

Contents: Computing Center; Data Processing Center; Analog Computing Laboratory; Advanced Computer Applications Laboratory; Propulsion Research Laboratory; Hypersonic Gun Tunnel; Solid-Propellant Rocket Tunnel; Experimental Radar Building; Battle Simulator; System Evaluation Laboratory; Missile Modification Center; Environmental Test Laboratory; Time and Frequency Standards Laboratory; Satellite Control Center; Satellite Tracking Station; Injection Station; Microelectronics Laboratory; High-Temperature Laboratory; Inertial Instruments Laboratory; Electronic Resistance-Welding Workshop; Television Presentation Network; Atlantic Missile Range Digital and Analog Data Processors.

AD-631 825 Fld. 14/2, 22/2
CFSTI Prices: HC $3.00 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB

THERMAL PROBLEMS INVOLVED IN SPACE SIMULATION,
by I. B. Irving, and W. J. Billerbeck. Aug 64, 54p. Rept. no. TG-595, Contract NOw-62-0604-c,

Unclassified report

Descriptors: (*Space simulation chambers, *Thermal radiation), (*Spacecraft components, Test equipment), Simulation, Space environmental conditions, Thermal properties, Vacuum, Space flight, Tests, Satellites (Artificial)

Simulation techniques provide a practical and relatively inexpensive means of obtaining thermal-vacuum characteristics of spacecraft and components. The results of these tests can be evaluated and compared with telemetered measurements of equipment when under actual orbital flight conditions. The ANNA earth satellite (1962 Beta MU 1) cited in this report is a typical example of a spacecraft being subjected to a thorough environmental test program prior to a successful orbital flight. (Author)

AD-631 233 See Fld. 20/11

AD-631 260 See Fld. 13/10

AD-631 301 See Fld. 20/11

AD-631 332 See Fld. 20/1

AD-631 400 See Fld. 6/11

AD-631 470 See Fld. 4/1

AD-631 514 See Fld. 9/5

AD-631 517 See Fld. 20/9

AD-631 518 See Fld. 8/3

AD-631 592 See Fld. 17/9

AD-631 596 See Fld. 20/3

AD-631 638 See Fld. 21/2

AD-631 649 See Fld. 20/4

AD-631 706 See Fld. 17/3

AD-631 712 See Fld. 5/1

AD-631 809 See Fld. 9/5

14/4. RELIABILITY

AD-631 495 Fld. 14/4, 12/1
CFSTI Prices: HC $1.60 MF $0.50
JET PROPULSION LAB CALIF INST OF TECH PASADENA
MODEL OF FAILURE IN COMPONENTS,
by S. E. Benesch, and C. R. Gates. 1966, 15p. Contract DA-04-495-ORD-18,

Unclassified report

Descriptors: (*Reliability, *Statistical distributions), (*Distribution theory, Reliability), Probability, Failure (Mechanics), Failure (Electronics), Mathematical models, Stresses, Fatigue (Mechanics), Sampling, Exponential functions, Special functions (Mathematics), Incandescent lamps

The theory of failure is fundamental in understanding the reliability of complex systems. This paper is a review of some aspects of the theory of failure of particular interest to statisticians. There are two approaches available in this theory: the phenomenological and the microscopic; an example of the letter approach is the dislocation theory of fatigue wherein molecular and crystal mechanisms of this kind of failure are analyzed, while an example of the former approach is a statistical distribution curve which is fitted to failure probability vs time of light bulbs. Treated are models of failure leading to three frequency functions of failure: the normal, the logarithmic-normal, and the exponential. In each instance these three classes are treated from both the phenomenological and the microscopic aspect. In conclusion, a problem of particular interest to statisticians is presented which arises in failure theory.

AD-631 525 Fld. 14/4, 15/5
CFSTI Prices: HC $3.00 MF $0.75
COMPUTER APPLICATIONS INC NEW YORK
FAILURE DISTRIBUTION ANALYSES STUDY. VOLUME ONE. STUDY AND ANALYSES.
10 Aug 64, 98p. Rept. no. CAI-NY-6052-Vol-1, Contract NObsr-89126,

Unclassified report

Descriptors: (*Failure (Mechanics), Fleets), (*Reliability, *Statistical distributions), Life expectancy, Graphics, Failure (Electronics)

This volume describes the study which was conducted to assess the effects of inferences based on the exponential assumption when the truncated normal, logarithmic normal, gamma or Weibull distribution is applicable and to provide the Bureau of Ships with a nonparametric method of reliability analysis. The objectives of this study were: (1) to develop a practical criterion of and quantify the sensitivity of exponential life quality characteristics estimated from life test or fleet failure data when the survivorship function is truncated normal, logarithmic normal, gamma or Weibull, (2) to provide fast, simplified graphical and/or mathematical reliability analysis procedures to determine the applicability of the exponential, truncated normal, logarithmic normal, gamma or Weibull distribution as the appropriate survivorship function of life test or fleet failure data and to estimate the appropriate function's parameters and life quality characteristics from the data and (3) to provide a practical nonparametric method of estimating life quality characteristics of life test or fleet failure data at different confidence levels.

AD-631 526 Fld. 14/4, 15/5
CFSTI Prices: HC $5.00 MF $1.25
COMPUTER APPLICATIONS INC NEW YORK
FAILURE DISTRIBUTION ANALYSES STUDY. VOLUME TWO. GRAPHICAL RELIABILITY ANALYSIS PROCEDURES.
10 Aug 64, 188p. Rept. no. CAI-NY-6052-Nol-2, Contract NObsr-89126,

Unclassified report

Descriptors: (*Failure (Electronics), Fleets), (*Reliability, *Graphics), Failure (Mechanics), Reliability (Electronics), Statistical distributions

This volume provides a detailed procedure for visually determining the applicability of the exponential, truncated normal, logarithmic normal, gamma or Weibull distribution as the appropriate survivorship function of life test or fleet failure data and for estimating the appropriate function's parameters and life quality characteristics from the data. Also presented is a practical nonparametric method estimating life quality characteristics of life test or fleet failure data at different confidence levels. To illustrate the practical applicability of these procedures two graphical reliability analyses of actual failure data are presented. The first analysis is of fleet failure data on the AN/SPS-10 covering the time period from November 1962 to August 1963. It consists of thrity-five (35) recorded times to failure. The second analysis is of censored field failure data on tubes from a group of fixed ground station communication receivers. It consists of forty-eight (48) recorded times to failure and sixty-eight (68) recorded times to suspension. The detailed procedures (step by step methods) used are presented in referenced sections following these analyses. (Author)

AD-631 527 Fld. 14/4, 15/5
CFSTI Prices: HC $4.00 MF $0.75
COMPUTER APPLICATIONS INC NEW YORK
FAILURE DISTRIBUTION ANALYSES STUDY. VOLUME THREE. TABLES OF PLOTTING POSITIONS.
10 Aug 64, 107p. Rept. no. CAI-NY-6052-Vol 3, Contract NObsr-89126,

Unclassified report

Descriptors: (*Failure (Mechanics), Fleets), (*Reliability, *Graphics), Statistical distributions, Tables, Life expectancy, Failure (Electronics)

This volume presents tables of plotting positions (percent failure) for use with the parametric and nonparametric graphical reliability analysis procedures presented in the companion volume subtitled 'Graphical Reliability Analysis Procedures,' (Volume Two). The tables used with the parametric procedures are linear scale and median ranks. The tables used with the nonparametric procedure presents plotting positions for different confidence levels ranging from zero point five (0.5) percent to ninety-nine point five (99.5) percent confidence. The plotting position tables cover sample sizes ranging from one (1) to fifty-four (54). An approximation formula to compute the plotting positions for sample sizes greater than fifty-four (54) is presented at the end of each table. (Author)

AD-631 351 See Fld. 1/3

14/5. REPROGRAPHY

AD-631 622 Fld. 14/5, 20/10, 20/12
FAIRCHILD SPACE AND DEFENSE SYSTEMS SYOSSET N Y BASIC RESEARCH LABS
CHEMICAL AND SPECTRAL SENSITIZATION OF THE SILVER HALIDES: EXCITON MECHANISMS IN LATENT -IMAGE FORMATION; EXCITON-EXCITON INTERACTION MECHANISMS IN SPECTRAL SENSITIZATION.
Revised ed.,
by James E. LuValle. 19 Mar 64, 14p. Contract AF 33 (657)-11105,

Unclassified report

Revision of manuscript submitted 6 Feb 64. Presented at the International Conference 1964, New York, N. Y., 30 Apr 64.

Availability: Published in Photographic Science and Engineering v8 n4 Jul-Aug 1964. Copies to DDC users only.

Descriptors: (*Photographic chemicals, Quantum statistics), (*Silver compounds, Halides), (*Photographic images, Quantum statistics), (*Photons, Photographic images), Photosensitivity, Band spectrum, Absorption spectrum, Theory, Ionization, Band theory of solids, Electron spin resonance, Bromides, Dyes, Carriers (Semiconductors), Crystals, Photoconductivity

In order to understand chemical and spectral sensitization of photographic materials, it is necessary to separate the primary photon absorption phenomena from the subsequent dark reactions and to specifically delineate the role of each sensitizing agent. The primary light absorption process are analyzed and on the basis of this analysis, the role of chemical sensitizers are discussed. The possible role of excitons in latent-image formation for absorption in the intrinsic absorption band are then examined. Proposed mechanisms of spectral sensitization are briefly discussed and a theory of spectral sensitization based upon exciton-exciton interaction is introduced and applied to the explanation of the phenomena of spectral sensitization. The

prime interest of the paper is in the specific role of chemical sensitizers and in the possible role of excitons in the intrinsic absorption band and in spectral sensitization.

AD-631 249 See Fld. 17/2

AD-631 445 See Fld. 21/5

Field 15-MILITARY SCIENCES

15/1. ANTISUBMARINE WARFARE

AD-631 720 See Fld. 8/10

15/3. DEFENSE

AD-631 299 Fld. 15/3
CFSTI Prices. HC $1.60 MF $0.50
RAND CORP SANTA MONICA CALIF
THE 1966 BRITISH DEFENSE REVIEW,
by H. A. DeWeerd. Apr 66, 14p.
Unclassified report

Descriptors: (*National defense, *Great Britain), Armed forces (Foreign), Military organizations, Costs, Armed forces budgets, Foreign policy, United States Government, Nuclear weapons, France, India, Middle East, Europe

The following implications seem to emerge from the 1966 defense white paper and debate: Britain has decided for the time being to maintain a presence in both Europe and the Far East. Labour leaders have accepted a role for Britain in relation to the United States which has been described as 'similar to that of Canada'. British defense capabilities will henceforth be strictly 'budget -limited' and no important military operation will be undertaken without the United States. Nothing indicates that Britain will give up its nuclear weapons capability in the foreseeable future but will keep it as a political counterweight to France's Force de Frappe. British participation in a nuclear 'guarantee' for India looks more remote than it did in 1965. Unless conditions change Britain will refrain from raising awkward questions of NATO strategy, nuclear free zones, and disengagement.

AD-631 756 Fld. 15/3, 8/6
CFSTI Prices: HC $8.65 MF $2.50
BUREAU OF THE CENSUS WASHINGTON DC
NATIONAL LOCATION CODE. OCD-OEP REGION 1.
1962, 459p. Rept. no. FG-D-3.1/1,
Unclassified report

Formerly rept. no. FG-IV-3.1/1.

Descriptors: (*Civil defense systems, Geography), Damage assessment, Population, Urban areas, Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Puerto Rico, Rhode Island, Vermont, Virgin Islands

The manual on the new National Location Code is published for the use of Federal, State and local civil defense and emergency planning officials with damage assessment, resource evaluation or shelter planning responsibilities. The manual is designed to serve users in two ways. First, it can be used as a convenient source for the geographic coordinates of new resources to be included in hand or computer damage assessment systems. Second, it provides, in a convenient form, the information on distribution of population that is required to prepare Region, State and local estimates of casualties resulting from actual or assumed enemy attack.

AD-631 757 Fld. 15/3, 8/6
CFSTI Prices: HC $8.65 MF $2.50
BUREAU OF THE CENSUS WASHINGTON DC
NATIONAL LOCATION CODE. OCD-OEP REGION 2.
1962, 462p. Rept. no. FG-D-3.1/2,
Unclassified report

Formerly rept. no. FG-IV-3.1/2. See also AD-631 756.

Descriptors: (*Civil defense systems, Geography), Damage assessment, Population, Urban areas, Delaware, District of Columbia, Kentucky, Maryland, Ohio, Pennsylvania, Virginia, West Virginia

AD-631 758 Fld. 15/3, 8/6
CFSTI Prices: HC $7.35 MF $2.00
BUREAU OF THE CENSUS WASHINGTON DC
NATIONAL LOCATION CODE. OCD-OEP REGION 3.
1962, 411p. Rept. no. FG-D-3.1/3,
Unclassified report

See also AD-631 756.

Descriptors: (*Civil defense systems, Geography), Damage assessment, Population, Urban studies, Alabama, Florida, Georgia, Mississippi, North Carolina, Panama, South Carolina, Tennessee

AD-631 759 Fld. 15/3, 8/6
CFSTI Prices: HC $8.25 MF $2.25
BUREAU OF THE CENSUS WASHINGTON DC
NATIONAL LOCATION CODE. OCD-OEP REGION 4.
1962, 442p. Rept. no. FG-D-3.1/4,
Unclassified report

Formerly rept. no. FG-IV-3.1/4. See also AD-631 756.

Descriptors: (*Civil defense systems, Geography), Damage assessment, Population, Urban areas, Illinois, Indiana, Michigan, Minnesota, Wisconsin

AD-631 760 Fld. 15/3, 8/6
CFSTI Prices: HC $7.10 MF $2.00
BUREAU OF THE CENSUS WASHINGTON DC
NATIONAL LOCATION CODE, OCD-OEP REGION 5.
1962, 376p. Rept. no. FG-D-3.1/5,
Unclassified report

Formerly FG-IV-3.1/5. See also AD-631 756.

Descriptors: (*Civil defense systems, Geography), Damage assessment, Population, Urban areas, Arkansas, Louisiana, New Mexico, Oklahoma, Texas

This manual on the new National Location Code is published for the use of Federal, State and local civil defense and emergency planning officials with damage assessment, resource evaluation or shelter planning responsibilities. The manual is designed to serve users in two ways. First, it can be used as a convenient source for the geographic coordinates of new resources to be included in hand or computer damage assessment systems. Second, it provides, in a convenient form, the information on distribution of population that is required to prepare Region, State and local estimates of casualties resulting from actual or assumed enemy attack. (Author)

AD-631 761 Fld. 15/3, 8/6
CFSTI Prices: HC $7.45 MF $2.00
BUREAU OF THE CENSUS WASHINGTON DC
NATIONAL LOCATION CODE, OCD-OEP REGION 6.
1962, 414p. Rept. no. FG-D-3.1/6,
Unclassified report

Formerly FG-IV-3.1/6. See also AD-631 756.

Descriptors: (*Civil defense systems, Geography), Damage assessment, Population, Urban areas, Colorado, Iowa, Kansas, Missouri, Nebraska, North Dakota, South Dakota, Wyoming

AD-631 762 Fld. 15/3, 8/6
CFSTI Prices: HC $7.00 MF $1.75
BUREAU OF THE CENSUS WASHINGTON DC
NATIONAL LOCATION CODE, OCD-OEP REGION 7.
1962, 233p. Rept. no. FG-D-3.1/7,
Unclassified report

Formerly FG-IV-3.1/7. See also AD-631 756.

Descriptors: (*Civil defense systems, Geography), Damage assessment, Population, Urban areas, Arizona, California, Hawaii, Nevada, Utah, Pacific Ocean Islands

AD-631 763 Fld. 15/3, 8/6
CFSTI Prices: HC $5.00 MF $1.25
BUREAU OF THE CENSUS WASHINGTON DC
NATIONAL LOCATION CODE, OCD-OEP REGION 8.
1962, 188p. Rept. no. FG-D-3.1/8,
Unclassified report

Formerly FG-IV-3.1/8. See also AD-631 756.

Descriptors: (*Civil defense systems, Geography), Damage assessment, Population, Urban areas, Alaska, Idaho, Montana, Oregon, Washington (State)

AD-631 613 See Fld. 5/10

15/5. LOGISTICS

AD-631 294 Fld. 15/5, 6/16
CFSTI Prices: HC $2.60 MF $0.50
NAVAL SUPPLY RESEARCH AND DEVELOPMENT FACILITY BAYONNE NJ
INVESTIGATION OF SHOE AND FOOT VOLUMES TO ESTABLISH A REDUCED SHOE SIZE TARIFF,
by Milton Bailey. Jul 65, 23p. Rept. no. 14-04-002-00-1,
Proj. T-F015-14 ,RENS-14-04-002-00-1
Unclassified report

Descriptors: (*Shoes, Measurement), (*Feet, Volume), Military requirements, Naval personnel

A series of measurements were made to learn the volume increments between shoe sizes, and to determine whether the volumes of feet and footwear are significantly changed after wear. The changes in foot volumes were determined by measuring the amount of water each subject's foot displaced before and after it supported his total weight for five minutes. The variations in shoe volumes were determined by measuring the quantity of Ottawa sand contained by the shoe cavity initially and after a prolonged period of wear. The increases in foot and shoe volumes averaged more than five and ten percent respectively. The work showed how it is possible to reduce the number of shoe sizes of the prevailing Military tariff from 113 to fewer than 50 sizes, without diminishing the selectivity or variety of shoe fits normally available to Navy personnel. (Author)

AD-631 295 See Fld. 11/5

AD-631 311 See Fld. 12/2

AD-631 525 See Fld. 14/4

AD-631 526 See Fld. 14/4

AD-631 527 See Fld. 14/4

AD-631 568 See Fld. 17/9

AD-631 733 See Fld. 8/6

15/6. NUCLEAR WARFARE

AD-631 773 See Fld. 20/11

15/7. OPERATIONS, STRATEGY, AND TACTICS

AD-631 309 Fld. 15/7
CFSTI Prices: HC $1.60 MF $0.50
INSTITUTE FOR DEFENSE ANALYSES ARLINGTON VA RESEARCH AND ENGINEERING SUPPORT DIV
THE WORTH OF TARGET KILL ASSESSMENT SYSTEMS.
Research paper,
by J. A. Navarro. Jan 66, 19p. Rept. no. IDA/HQ-66-4466,RP-P-231
Contract SD-50, Task T-12,
Unclassified report

Descriptors: (*Kill probability, Determination), (*Weapons, Kill probability), Effectiveness

A model is developed for predicting the expected number of attacks to be made as a function of the target kill assessment (TKA) probabilities, the single attack kill probability, the confidence on the level of kill desired, and the maximum number of attacks available. The expected number of attacks is compared with the expected number of attacks required if no TKA data are available. Finally, the maximum number of attacks that might be required to achieve the desired kill confidence is computed. (Author)

AD-631 362 Fld. 15/7
CFSTI Prices: HC $2.00 MF $0.50
HUMAN ENGINEERING LABS ABERDEEN PROVING GROUND MD
ACQUIRING AND RELOCATING TARGETS FROM A HELICOPTER: A PRELIMINARY INVESTIGATION.
Technical memo.,
by Richard A. Monty, Samuel A. Hicks, and Calvin G. Moler. Jan 66, 29p. Rept. no. TM-2-66,
Unclassified report

Descriptors: (*Target acquisition, Airborne), (*Helicopters, Aerial warfare), (*Aerial warfare, Aviation safety), Evasion, Maneuverability, Detection, Human engineering, Aerial reconnaissance

This preliminary investigation was conducted to help resolve the controversy over whether or not a helicopter in combat can increase its safety by performing an evasive maneuver after detecting a target but before firing on it. The result showed that, at least in one situation, the evasive maneuver can give the helicopter some advantage, but not for the reasons hypothesized. It was concluded that the problem is sufficiently complex to warrant additional research. (Author)

AD-631 781 Fld. 15/7, 5/10, 9/2
CFSTI Prices: HC $1.00 MF $0.50
OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS HUMAN PERFORMANCE CENTER
FURTHER INVESTIGATION OF THE EFFECTS OF REDUCED INPUT DATA FIDELITY UPON THE DETERMINATION OF POSTERIOR PROBABILITIES IN A SIMULATED THREAT-DIAGNOSIS SYSTEM.
Final rept., 15 Mar-1 Aug 64,
by David A. Schum, Irwin L. Goldstein, and Jack F. Southard. Dec 65, 21p. Contract AF 33 (657)-10763, Proj. AF-7184, Task 718403, AMRL TR-65-233
Unclassified report

See also AD-607 256, -608 108, -615 758.

Descriptors: (*Threat evaluation, *Decision making), (*Statistical analysis, Military intelligence), Computers, Simulation, Probability, Mathematical prediction, Human engineering, Data processing systems

This is the fifth in a series of experiments on Bayesian diagnostic systems. In this experiment two procedures for obtaining a posteriori (P (H/D)) probability estimates were compared under conditions of low fidelity of input data and various levels of time-stress. In one procedure a computer aggregated the subjects' a priori (P (D/H)) estimates. In the alternate procedure the a posteriori probabilities were estimated by the subjects without computer aid. The results favor the computer-aided procedure and tend to support the use of automated Bayesian hypothesis-selection procedures in diagnostic systems. (Author)

AD-631 245 See Fld. 4/2

AD-631 509 See Fld. 4/2

Field 16-MISSILE TECHNOLOGY

16/1. MISSILE LAUNCHING AND GROUND SUPPORT

AD-631 641 Fld. 16/1, 13/13, 13/2, 13/3, +
CFSTI Prices: HC $1.00 MF $0.50
AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C
SOVIET LITERATURE ON PROTECTIVE STRUCTURES AND COMPONENTS: COMPILATION OF ABSTRACTS.
Rept. no. 13 on ATD work assignment no. 13.
20 Nov 64, 15p. Rept. no. U-64-115,
TT 66-61112
Unclassified report

Series on repts. reviewing Soviet literature, pub. 27 Mar-28 Jun 64. Rept. on Surveys of Soviet-Bloc Scientific and Technical Literature. See also AD-623 237.

Descriptors: (*Guided missiles, Ground support equipment), (*Ground support equipment, USSR), Railroads, Bridges, Roads, Railroad tracks, Hoists, Containers, Underground structures, Tracked vehicles, Prefabricated buildings, Reinforced concrete

Resumes are given on the following articles from Soviet literature. TRANSPORT: Abdulgradimov, A. I., and S. N. Vlasov. Application of unified prefabricated ferroconcrete tunnel lining. Transportnoye stroitel'stvo, no. 6, 1964, 18-20. Aretinskiy, V. A., and I. I. Merinov, Loads and clearance gauges for automobile-road bridges, and clearance gauges for railroads. Handbook of a bridge- and-tunnel foreman. Moscow, 1963. 342-343 and 332-335, respectely. Deutsche Eisenbahntechnik, no. 6, 1964, 285. Railroad-Train ferry. Kozlovskiy, B.K., and N. F. Geyko. New standards for a 1524-mm track design of the general-railroad network. Transportnoye stroitel'stvo, no. 5, 1964, 39-40. Zemblinov, S.V., and I. I. Strakovskiy. Statsii i uzly. Railroad-train ferries. Moscow, 1963. 281-282. Zeleznicni doprava a technika, no. 5, 1964, 135. Broad -gauge railroad line between Bagdad and Basra. Launch site: Khodov, M. P. Tower crane BK-406B. Montazhnyye i spetsial'nyye raboty v stroitel'stvo, no. 6, 1962, 22. Packaging, preservation, and storage: Semenov, V. M. Transportation-dispatch service in a large junction. Zheleznodorozhnyy transport, no. 6, 1964, 66.

AD-631 646 Fld. 16/1, 13/9
CFSTI Prices: HC $3.60 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
FLUID MAGNETIC SPRING, DAMPER AND LOCKOUT DEVICE FOR POLARIS LAUNCHER MARK 1 MOD O.
Interim rept.,
by R. E. Kemelhor. Aug 59, 34p. Rept. no. TG-465,
Contract NOrd-7386,
Unclassified report

Descriptors: (*Guided missiles (Underwater-to-surface), Guided missile launchers), (*Guided missile launchers, *Springs), Damping, Vibration isolators, Fluids, Magnetic materials, Iron, Silicones, Oils, Metal carbonyls

A mixture of 50 per cent carbonyl iron powder (8 micron size) and 50 per cent silicone oil has been developed which provides the desired viscosity characteristics between zero and maximum magnetization. A method for sealing the magnetic liquid under high pressure conditions has been developed. A magnetic liquid spring has been built meeting the required spring constants, damping factors, and lockout characteristics can be met. A method for maintaining the mixture in solution, without settling of the iron particles, has been developed. By placing the coil inside the spring, around a comparatively long orifice pipe, it may be possible to build smaller, lighter, and more versatile liquid springs. The amount of electrical energy required to provide 600 to 2300 lb forces over a 1-inch requires approximately 25 watts for maximum magnetization.

AD-631 558 See Fld. 4/2

16/4. MISSILES

AD-631 248 Fld. 16/4
CFSTI Prices: HC $4.00 MF $0.75
BOEING CO SEATTLE WASH
PROBLEM SUMMARY REPORT, STP III.
Summary rept. 3 Jan 64-25 Mar 65.
25 Mar 65, 102p. Rept. no. T2-3118-2,
Contract AF 04 (694)-422,
BSD TR-66-81
Unclassified report

Descriptors: (*Guided missile components, Tests), Guided missiles, Failure (Electronics), Failure (Mechanics), Calibration, Guided missile launchers

AD-631 682 Fld. 16/4, 21/8
CFSTI Prices: HC $1.00 MF $0.50
DEPARTMENT OF THE NAVY WASHINGTON D C
GUIDED BALLISTIC MISSILES AND THEIR ENGINES,
by G. S. Shchennikov. 1966, 15p. Rept. no. Trans-993,
TT 66-61119
Unclassified report

Upravlyaemye Ballisticheskie Rakety i Ikh Dvigateli, trans. of Morskoi Sbornik (USSR) v46 n3 p67-74 1963.

Descriptors: (*Guided missiles (Surface-to-surface), Reviews), (*Rocket motors, Reviews), Guided missile trajectories, Rocket motors (Solid propellant), Rocket motors (Liquid propellant), Specific impulse, Thrust, Operation, Velocity, Ranges (Distance), Loading (Mechanics), USSR

A technical review is given of ballistic missile trajectory fundamentals, specific thrust, liquid fuel rocket engine operation, solid fuel engine operation, and Tsiolkovskiy's number and initial thrust loading.

AD-631 793 Fld. 16/4, 20/11
CFSTI Prices: HC $1.60 MF $0.50
DEFENSE RESEARCH LAB UNIV OF TEXAS AUSTIN
FREE VIBRATION CHARACTERISTICS OF RECTANGULAR CANTILEVER PLATES,
by M. V. Barton. 24 May 49, 17p. Rept. no. DRL-212 ,CF-1258

Unclassified report

Descriptors: (*Vibration, *Cantilever beams), (*Guided missile components, Fins), Dynamics, Rectangular bodies, Mathematical analysis

As a step in the determination of the dynamic characteristics of missile fins, the frequencies and mode configurations of free vibration of uniform rectangular plates fixed along one edge are obtained for various (1/2, 1, 2, 5) cantilever span to chord ratios. Equations are set up in terms of influence coefficients and solved by matrix iteration. The Ritz method is also used in which the plate energies are expressed in terms of beam functions corresponding to the normal modes of vibration of uniform beams. It is shown that the first plate bending (symmetric) frequency corresponds closely to that of a uniform cantilever beam modified to account for the plate flexural rigidity factor. The first torsional (antisymmetric) frequency varies almost linearly with plate length to breadth ratio. An empirical equation is developed for ease in determination of this frequency. Experimental spot checks on a square cantilever plate indicate agreement within 2 percent of theoretical values for the first two frequencies. (Author)

AD-631 423 **See Fld. 13/8**

AD-631 703 **See Fld. 17/4**

AD-631 768 **See Fld. 17/7**

16/4.2 SURFACE-LAUNCHED MISSILES

AD-631 443 Fld. 16/4.2, 21/8.1
CFSTI Prices: HC $3.00 MF $0.75
BENDIX MISHAWAKA DIV BENDIX CORP IND
DEVELOPMENT OF A HERMETIC SEALED NITROGEN STORAGE SYSTEM FOR THE TALOS RIM-8E FUEL PRESSURIZATION SYSTEM.
Final rept.,
by W. B. Claxton. 9 Feb 66, 67p. Rept. no. BxM-5930,
Contract NOw-65-0289-c,

Unclassified report

Descriptors: (*Guided missile components, Pressure vessels), (*Fuel systems, *Pressure vessels), (*Tanks (Containers), Fuel systems), Nitrogen, Storage, Guided missiles (Surface-to-air), Shipborne, Hermetic seals, Release mechanisms, Valves, Explosives initiators, Pressure gages

The report describes a method used to provide a 2150 psi nitrogen storage system that retains operational pressure for a minimum period of three years without interim servicing. A hermetic tank seal and a squib operated release mechanism were developed for this purpose. The release mechanism utilizes a notched release tube that, when impacted by a squib operated piston, ruptures providing a contamination free path to a pressure regulator. Emphasis was given to methods that would permit retrofit of an existing storage system. (Author)

AD-631 699 Fld. 16/4.2, 5/1
CFSTI Prices: HC $4.00 MF $1.00
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
MINUTES OF THE FIRST SEMI-ANNUAL TYPHON PERT CONFERENCE HELD AT THE APPLIED PHYSICS LABORATORY ON OCTOBER 29 AND 30, 1962.
1 Jan 63, 147p. Rept. no. TG-452-1,
Contract NOw-62-0604-c,

Unclassified report

Descriptors: (*Guided missiles (Surface-to-air), Management engineering), Research program administration, Costs, Time

The conference was sponsored by the TYPHON Weapon System Analysis Center. The purposes of the meeting were: (1) To exchange PERT/Cost information, (2) To define particular problems concerning the development of integrated PERT/Time/Cost systems. CONTENTS: Latest DoD PERT coordination committee and BUWEPS developments, by Y. Nakayama; TYPHON management PERT/time/cost requirements, by H. R. Moody; Bendix, Mishawaka, PERT display and reporting techniques, by T. Grove; PERT reporting, by V. P. Arrigo; use of COMTRAN to expand computer capacity, by W. Soden; Bendix, Mishawaka, PERT/cost system, by R. R. Skudlarek; General Dynamics, Pomona, PERT/cost system, by J. Overturf, Part A; P. Simon, Part B; constrained events listing, by D. L. Saunders.

Field 17-NAVIGATION, COMMUNICATIONS, DETECTION, AND COUNTERMEASURES

17/1. ACOUSTIC DETECTION

AD-631 328 Fld. 17/1, 11/4, 13/10
CFSTI Prices: HC $1.10 MF $0.50
GOODRICH (B F) AEROSPACE AND DEFENSE PRODUCTS AKRON OHIO
PRESSURIZED BOW DOME OF A CABLE-REINFORCED RUBBER CONSTRUCTION FOR USE WITH AN/SQS-26 SONAR.
Monthly summary rept., 31 Aug-30 Sep 65,
by R. A. Johnston. 30 Sep 65, 9p. Rept. no. 31,
Contract NObsr-89483, Task 8156,

Unclassified report

See also AD-619 068.

Descriptors: (*Sonar domes, Composite materials), (*Rubber, Sonar domes), (*Cables (Mechanical), Reinforcing materials), Sonar, Ship hulls, Fairings

The method for fairing the rubber window to the ship's hull is being finalized. A simulated fairing installation was completed on the prototype test panel. Salt water immersion tests are continuing for further evaluating materials and adhesives used in the fairing operation. 'Debugging' of input data was completed for the DE 1040/DE 1052 semi-universal rubber window contour for DTMB cavitation study program.

AD-631 344 Fld. 17/1
CFSTI Prices: HC $3.00 MF $0.75
GENERAL DYNAMICS CORP GROTON CONN ELECTRIC BOAT DIV
TRANSDUCER SHOCK STUDY,
by A. D. Carlson, and R. J. McGrattan. 31 Oct 65, 69p. Rept. no. U411-65-054,
Contract N70024-1273,

Unclassified report

Descriptors: (*Transducers, Sonar), (*Shock waves, Transducers), Underwater explosions, Explosion effects, Mathematical models

A sonar transducer was analyzed to determine the stresses induced in the ceramic drive element by an underwater explosion. The explosion forces are considered as a hydraulic shock along the axis of the transducers, and a mechanical shock normal to this axis. The analysis demonstrates that the peak stresses due to these two loadings occur in two distinct time periods. Therefore, the two types of shock motions are essentially independent of each other. The hydraulic shock at a given standoff is more damaging to the ceramic. Analytical and experimental standoffs for failure compare favorably. (Author)

17/2. COMMUNICATIONS

AD-631 620 Fld. 17/2, 20/1
CFSTI Prices: HC $2.00 MF $0.50
LITTON SYSTEMS INC WALTHAM MASS
THEORETICAL AND EMPIRICAL RESULTS ON THE CHARACTERIZATION OF UNDERSEA ACOUSTIC CHANNELS,
by Alan W. Ellinthorpe, and Albert H. Nuttall. 1966, 32p. Rept. no. TR-65-8-BF,
Contract N140 (70024)-71894B ,N140 (70024)-75103B

Unclassified report

Descriptors: (*Underwater communication systems, Acoustics), Audiofrequency, Integral transforms, Functions, Time, Stochastic processes, Linear systems

An undersea acoustic link between two points in space is represented as a random time-varying linear filter. It can therefore be characterized by its impulse response, or alternately by various Fourier transforms, known as the transfer functions, spreading function, and bi-frequency function. All four of these descriptors are random functions of two variables. A generalization of the uncorrelated scattering model is proferred and it is shown how it can fit known ocean characteristics. Results are presented of some measurements made of the time and frequency spreading imposed on audio frequency transmissions over open ocean underwater paths. Most of the results deal with frequency spreading; there are fine grain time domain measurements. Results are given for several center frequencies ranging from the low hundreds to the low thousands of cycles per second. Paths between both fixed and mobile end points have been measured. The path lengths used have ranged from one-half to several hundreds of miles. The results indicate that many of the simplifying assumptions usually made in discussions of time varying channels are not satisfied by these paths, and these points where the assumptions must be generalized are briefly discussed. (Author)

AD-631 240 **See Fld. 9/4**

AD-631 249 **See Fld. 17/2**

AD-631 270 **See Fld. 9/5**

AD-631 324 **See Fld. 9/4**

AD-631 396 **See Fld. 9/2**

AD-631 446 **See Fld. 22/3**

AD-631 465 **See Fld. 9/3**

AD-631 478 **See Fld. 9/5**

AD-631 546 **See Fld. 9/3**

AD-631 693 **See Fld. 9/4**

17/2.1 RADIO COMMUNICATIONS

AD-631 249 Fld. 17/2.1, 17/2, 14/5
CFSTI Prices: HC $12.60 MF $1.00
BATTELLE MEMORIAL INST COLUMBUS OHIO REMOTE AREA CONFLICT INFORMATION CENTER
THE DEVELOPMENT OF A MODULAR AUDIO-VISUAL UNIT (MAVU),

by Eugene N. Wyler, and Carl L. Hanks. 20 Apr 66, 110p. Rept. no. BAT-171-39,
Contract SD-171,

Unclassified report

Descriptors: (*Voice communication systems, Design), (*Photographic recording systems, Design), Portable mobile, Public address systems, Motion picture projectors, Magnetic recording systems, Radio receivers, Generators, Amplifiers, Loudspeakers, Psychological warfare, Thailand, Tests

The development of the Mark II and Mark III Modular Audio-Visual Units is the result of a need for an audio-visual system that would provide the portability required for remote operation by psychological-warfare teams. The major constituents of the MAVU's include a public-address amplifier, radio, tape recorder, and motion-picture projector. A complete description of the Mark II and Mark III MAVU's, including detailed drawings, is presented. Two field evaluations were conducted in Thailand. The first field evaluation tested and proved the concept of the MAVU and its construction from commercial off-the-shelf components. The second field evaluation was a test of prototype production models, the Mark II and Mark III, which incorporated recommendations for improvements that resulted from the first field evaluation. (Author)

AD-631 492 Fld. 17/2.1
CFSTI Prices: HC $1.60 MF $0.50
ELECTRO-VOICE INC BUCHANAN MICH
LIGHT WEIGHT AUDIO ACCESSORIES.
Quarterly technical rept. no. 2, 30 Sep-31 Dec 65, by B. T. Cochran. Apr 66, 19p. Contract DA-28-043-AMC-01542 (E), Proj. DA-5642.12.922.07.02,
ECOM 01542-2

Unclassified report

See also AD-628 672.

Descriptors: (*Communication equipment, Portable), Microphones, Earphones, Telegraph equipment, Configuration, Reduction, Weight

Work consisted of finalizing the physical configuration and proving that the weight requirements as specified have been met except for the double earphone headset which is within 11 grams of the specified weight. (Author)

AD-631 497 See Fld. 9/2

AD-631 603 See Fld. 9/5

17/3. DIRECTION FINDING

AD-631 706 Fld. 17/3, 14/2
CFSTI Prices: HC $10.60 MF $0.75
GENERAL TIME CORP STAMFORD CONN ACRONETICS DIV
A PRECISION TRACKING DRIVE SYSTEM.
Final rept., Jul 63-Jan 66,
by Chester A. Darling. 5 Jan 66, 107p. Rept. no. 8138,
Contract AF 19 (628)-3293, Proj. AF-6682, Task 668209,
AFCRL 66-71

Unclassified report

Descriptors: (*Tracking, *Synchros), (*Direction finding, Synchros), Airborne, Balloons, Radio transmitters, Ultrahigh frequency, Direction finding signals, Radio receivers, Parabolic antennas, Phase detectors, Driver, Recording systems, Data processing systems, Integral transforms, Functions, Circuits, Control systems, Radiosondes

This report covers the modification of a Rawin Set AN/GMD-2 azimuth and elevation tracking system to provide improved tracking characteristics and conversion to solid-state circuitry throughout the control system. The analyses leading to the design of satisfactory compensation circuitry are described, as are the special test units used in measuring functions and responses. (Author)

AD-631 802 Fld. 17/3, 22/3
CFSTI Prices: HC $2.00 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
A DESCRIPTION OF THE DOPPLER TRACKING SYSTEM TRANET,
by R. R. Newton. May 63, 45p. Rept. no. TG-571,
Contract NOw-62-0604-c,

Unclassified report

Descriptors: (*Doppler systems, *Satellite tracking systems), (*Tracking, Doppler systems), Naval research, Satellites (Artificial), Clocks, Time-interval counters, Time signals, Doppler effect, Data transmission systems, Networks, Command + control systems, Data processing systems, Orbital trajectories, Position finding, Frequency, Standards

The Doppler tracking system Tranet has the capability of worldwide dissemination of a standard frequency, with proper assistance from a satellite, with an accuracy that exceeds 2 parts in 10 to the 10th power with present equipment. It can also disseminate standard time signals with a resolution of at least 50 micro sec. for a single pass. The system is also capable of measuring the Doppler frequency received from a satellite with an accuracy of 2 parts in 10 to the 10th power. This accuracy allows a resolution in satellite position of 30 meters at the center time of a pass. It is technically feasible to increase the frequency accuracy to a level approaching or exceeding 1 part in 10 to the 11th power, with a corresponding position resolution approaching 1 meter. Dissemination of standard frequency can also be made to approach 1 part in 10 to the 11th power. The accuracy of orbit determination is not currently limited by measurement accuracy, but by the accuracy of gravity and geodesy. At present, the RMS orbital accuracy is estimated at 300 meters world-wide, and 200 meters over North America. Ten satellites looks like a reasonable estimate of the number that can be handled reliably, in full time operations at maximum accuracy. (Author)

17/4. ELECTROMAGNETIC AND ACOUSTIC COUNTERMEASURES

AD-631 703 Fld. 17/4, 17/7, 16/4
CFSTI Prices: HC $2.60 MF $0.50
NAVAL ORDNANCE LAB CORONA CALIF
NOISE MODULATION.
Technical memo.,
by Robert L. Conger. Aug 59, 21p. Rept. no. NOLC-TM-42-34,

Unclassified report

Descriptors: (*Modulation, *Noise), (*Electronic counter countermeasures, *Guided missiles), Radar antijamming, Noise generators, Radar homing, Guidance, Command guidance, Radar signals

Noise modulation systems can give missiles up to 40 db resistance to electronic countermeasures. Active homing and fuzing systems can use simple noise sources. Command and semiactive systems must have a pair of generators which generate identical noise like signals. Such generators can be constructed from magnetic cores and diodes. (Author)

17/5. INFRARED AND ULTRAVIOLET DETECTION

AD-631 225 Fld. 17/5
CFSTI Prices: HC $3.00 MF $0.50
NAVAL ORDNANCE LAB CORONA CALIF
PROPERTIES OF PHOTODETECTORS (PHOTODETECTOR SERIES, 69TH REPORT),
by W. L. Eisenman. 15 Feb 66, 51p. Rept. no. NOLC-637,
Task RMGA-81-105/211-1/F009-03-01,

Unclassified report

Descriptors: (*Infrared detectors, Life expectancy), Thermistors, Bolometers, Storage, Radiation damage, Lead compounds, Sulfides, Selenides, Indium compounds, Antimony alloys, Indium alloys, Photoconductivity, Optical materials

Contents: Aging of PbS detectors, by John Bisbee; Aging and storage characteristics of InSb infrared detectors manufactured by Texas Instruments, by Bill Kolander; Storage and aging data on PbSe infrared detectors, by K. S. Pilger; Shelf life characteristics of thermistor bolometer infrared detectors manufactured by Servo Corporation of America, by Arthur Woodward; Nuclear radiation effects on infrared detectors and optical materials, by Russell DeWaard.

AD-631 251 Fld. 17/5, 9/5
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF RADIO AND ELECTRICAL ENGINEERING
PREAMPLIFIER FEATURES LOW NOISE FOR USE WITH IR DETECTORS,
by R. L. Gattinger. 1966, 2p.
NRC 8859

Unclassified report

Availability: Published in Canadian Electronics Engineering Apr 1966. Copies to DDC users only.

Descriptors: (*Infrared detectors, *Preamplifiers), Noise, Reduction, Transistors, Circuits, Wiring diagrams

A suitable preamplifier was developed using field-effect transistors to achieve a noise figure of about 1.2 dB at 100 Hz with a source resistance of 1 M ohms.

AD-631 274 Fld. 17/5
CFSTI Prices: HC $1.10 MF $0.50
MARINE CORPS LANDING FORCE DEVELOPMENT CENTER QUANTICO VA
INFRARED RECEIVER, AN/SAR-7.
Final rept.,
by F. L. Wieseman. 17 Mar 66, 4p.

Unclassified report

Descriptors: (*Infrared receivers, Tests), (*Infrared detectors, Tests), Marine Corps

The AN/SAR-7 consists of an infrared receiver, a cushioned carrying case with a detachable strap, a 4-power eyepiece that can be used in lieu of the regular 8.6-power eyepiece, a waterproof cover for the infrared receiver, and a self-contained power source. The handheld infrared receiver is used for the detection of infrared transmissions or for general infrared surveillance. CONCLUSIONS: It is concluded that: The test item (1) is suitable for Marine Corps use as a replacement for the C-3, NANCY infrared receiver, may have an application for use as a surveillance device by close combat units, and has substantial overlapping capability with that of the Image Metascope, T-7, and the AN/UAM-2 infrared optical tester, should be made available for fourth and higher echelon maintenance of the test item, if adopted.

AD-631 768 See Fld. 17/7

17/7. NAVIGATION AND GUIDANCE

AD-631 768 Fld. 17/7, 17/5, 16/4
CFSTI Prices: HC $1.00 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
INFRARED RADIATION AND ITS APPLICATION IN ROCKETS,

by Chen Tei. 15 Mar 66, 9p. Rept. no. FTD-TT-65-926,
TT 66-61125

Unclassified report

Edited trans. of Tien Tzu Chi Shu, n4 p31-3 1964.

Descriptors: (*Guided missiles, *Infrared equipment), Infrared radiation, Infrared scanning, Opdar, Guidance, Infrared tracking, Homing devices, Heat homing, China

A semi-technical discussion dealing with the nature of infrared radiation, infrared radar, and infrared missile guidance.

AD-631 277 See Fld. 8/5

AD-631 695 See Fld. 14/2

AD-631 703 See Fld. 17/4

17/8. OPTICAL DETECTION

AD-631 361 Fld. 17/8, 5/9
CFSTI Prices: HC $2.60 MF $0.50
HUMAN ENGINEERING LABS ABERDEEN PROVING GROUND MD
A FIELD SURVEY OF AIR-TO-GROUND TARGET-DETECTION PROBLEMS.
Technical memo.,
by Samuel A. Hicks, and Calvin G. Moler. Jan 66, 30p. Rept. no. TM-1-66,

Unclassified report

Descriptors: (*Target recognition, Surface targets), (*Target identification, Surface targets), (*Detection, Human engineering), Physical properties, Airborne, Human engineering, Helicopters

Twenty enlisted men were tested on a target-detection task at Ford Ord, California. Each subject was required to detect ten targets appearing at ranges of 1000 meters to 2100 meters. Forty trials were run. The results indicate that detection and identification depend on more than mere distance between target and observer. Not only did a target's size and form affect its detectability, but it appeared that the main cause of misidentifications was differing targets with similar sizes and forms. These results are related to current literature, and their implications for the course of the program are examined. (Author)

AD-631 427 Fld. 17/8, 4/1, 20/6
CFSTI Prices: HC $6.60 MF $0.75
LINCOLN LAB MASS INST OF TECH LEXINGTON
EFFECT OF NIGHT SKY BACKGROUNDS ON OPTICAL MEASUREMENTS.
Final rept.,
by Robert M. Chapman, and Robert O'B Carpenter. 6 Mar 59, 67p. Contract AF 19 (604)-4559, ESD TDR-66-168

Unclassified report

Subcontracted to Geophysics Corp. of America, Boston, Mass.

Descriptors: (*Night sky, *Optical tracking), Reentry vehicles, Ionization trails, Atmosphere entry, Tracking, Tracking telescopes, Infrared detectors, Spectrum analyzers, Photomultipliers, Optics, Atmosphere

A review is given of the sources and magnitudes of the night sky backgrounds, from 0.3 to 5 microns particularly as they might interfere with the observation of the spectrum of a small missile reentering the atmosphere. Distributions of stellar magnitude and color, zodiacal and galactic scattered light, air glow, twilight, moonlight, and manmade lighting are discussed. Application is made of the background magnitude data to estimate the limitation of the threshold of large telescope-spectrometers using 1P21, PbS, and other detectors. Objective and slit-type spectrographs are considered, including the requirements for, and effect of, tracking precision. (Author)

AD-631 438 Fld. 17/8, 22/3
CFSTI Prices: HC $4.60 MF $0.50
AEROSPACE RESEARCH LABS OFFICE OF AEROSPACE RESEARCH WRIGHT-PATTERSON AFB OHIO
ADVANTAGES OF A 4-AXIS TRACKING MOUNT FOR THE PHOTOELECTRIC PHOTOMETRY OF SPACE VEHICLES,
by Kenneth E. Kissell. Dec 65, 46p. Rept. no. ARL-65-260,
Proj. AF-7114,

Unclassified report

Descriptors: (*Tracking telescopes, Operation), (*Satellites (Artificial), Optical tracking), Space surveillance systems, Signal-to-noise ratio, Celestial mechanics, Spacecraft, Photometers

Arguments are presented for the necessity of using a four-axis telescope (Quad-R-Axial) mount for the photoelectric photometry of satellites if small field apertures and hence low sky background signals are to be achieved. Since the signal to noise ratio of the target/background is proportional to the square of the diameter of accepted field, any reduction of guiding errors which will allow smaller field apertures will then allow the photometry of fainter satellites, providing telescopes of adequate aperture are used. The improved tracking will also reduce interruptions of the light curves resulting from loss of the vehicle from the sensing aperture. The improvements possible with a QRA mount over the 2-axis (alt-azimuth) and the 3-axis (Baker-Nunn) are shown and procedures for computation of mount settings established. Photoelectric data taken with an existing 3-axis system are given for several satellites. (Author)

AD-631 451 Fld. 17/8, 22/3
CFSTI Prices: HC $2.60 MF $0.50
OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS
A PREDICTION AND TRACKING METHOD FOR SMALL-APERTURE, CONTINUOUS OPTICAL TRACKING OF ARTIFICIAL SATELLITES.
Scientific rept.,
by Richard C. Vanderburgh. Jan 66, 30p. Contract AF 33 (615)-1915, Proj. AF-7114,
ARL 66-0008

Unclassified report

Descriptors: (*Satellite tracking systems, *Optical tracking), Photometers, Telescopes, Tests

Field-proven prediction and tracking techniques are discussed, with their application to a 4-axis mounted 24-inch Cassegrainian telescope. Although the actual tracking performed to date has been for the purpose of photoelectric photometry of satellites, the successful techniques employed are applicable to other optical satellite tracking missions whose requirements include a large-aperture detection capability coupled with precision small-aperture continuous tracking. Emphasis is upon the efficient combination of a skilled computer-observer with inexpensive equipment, a combination which provides a wide range of versatility and flexibility. The tracking method described is, in effect, the author's practical application of a proposal by Kenneth E. Kissell presented at the COSPAR Symposium of Florence, May 1964. This investigation has been conducted in coliaboration with Mr. Kissell. (Author)

17/9. RADAR DETECTION

AD-631 568 Fld. 17/9, 15/5
CFSTI Prices: HC $9.60 MF $0.75
EMERSON AND CUMING INC CANTON MASS
ANALYSIS STUDY OF RADAR CROSS-SECTION OF THE CLOTHED SOLDIER IN X, K, AND MILLIMETER BANDS.
Technical rept. 20 Nov 63-19 Nov 64,
by Elery F. Buckley, and Eino Luoma. Feb 66, 96p. Contract DA-19-129-AMC-220 (N), Proj. DA-1K643303D547-14,
ANL 66-5-CM ,ANL TS-133

Unclassified report

Descriptors: (*Army personnel, Radar echo areas), (*Army equipment, Radar echo areas), (*Radar echo areas, Army personnel), X-band, K-band, Millimeter waves, Microwave frequency, Absorption, Clothing, Camouflage, Protective clothing

Monostatic radar cross-section data for a special mannequin, designed to simulate electrically a typical human target, are presented for a total of ten different typical combinations of infantry clothing and equipment. Data are for a 360 degree range of aspect angles; three frequencies: 9.375, 24, and 33 Gc; and two polarizations: vertical and horizontal. The measured radar cross-sections for the typical infantryman are compared with the sensitivity of the AN/PPS-4 radar system and the masking effects of typical terrain reflections. Results of an experimental program to reduce the radar cross-section of the infantryman with a special suit of absorbing material are reported. It is concluded that the development of microwave absorber clothing for the infantryman to reduce vulnerability to detection by radar is both feasible and desirable. (Author)

AD-631 592 Fld. 17/9, 9/2, 14/2
CFSTI Prices: HC $7.00 MF $1.75
PENNSYLVANIA RESEARCH ASSOCIATES INC PHILADELPHIA
INVESTIGATION OF COMPUTER TECHNIQUES FOR RADAR LANDMASS SIMULATION.
Final technical rept. for 1963-1965.
Feb 66, 356p. Contract N61339-1526, Proj. 7076-02,
NTDC 1526-1

Unclassified report

Descriptors: (*Digital computers, Radar trainers), (*Terrain, Simulators), (*Radar trainers, Computers), (*Analog-digital computers, Radar trainers), Radar scanning, Airborne, Radar equipment, Mapping, Communication theory, Simulation, Radar target position simulators, Display systems, Feasibility studies

Advanced mathematical and computational techniques for simulation of the display produced by an airborne radar over a wide range of flight regimes and radar equipments. Incorporation of a small-scale, general-purpose digital computer, in combination with specialized methods of efficient terrain representation, to control special-purpose analog function generation circuits. Resulting waveform, simulated in real time under operator control without necessity for preprogramming of flight path, is to be displayed for advanced radar training. (Author)

AD-631 321 See Fld. 9/5

AD-631 650 See Fld. 22/3

17/10. SEISMIC DETECTION

AD-631 285 See Fld. 8/11

AD-631 340 See Fld. 8/11

Field 18-NUCLEAR SCIENCE AND TECHNOLOGY

18/2. ISOTOPES

AD-631 198 See Fld. 20/8

18/3. NUCLEAR EXPLOSIONS

AD-631 340 **See Fld. 8/11**

18/4. NUCLEAR INSTRUMENTATION

AD-631 318 Fld. 18/4
CFSTI Prices: HC $6.00 MF $1.25
EDGERTON GERMESHAUSEN AND GRIER INC SANTA BARBARA CALIF
MANUAL OF RADIATION DOSIMETRY EXPERIMENTS,
by Kent C. Humpherys. Nov 65, 218p. Contract DA-49-146-XZ-226,
AFRRI CR-65-4

Unclassified report

Descriptors: (*Dosimeters, Instruction manuals), Dose rate, Ionization, Dosage, Tissues (Biology), Ionization chambers, Thermal neutrons, Neutron detectors, Fast neutrons, Gamma rays, Radiation damage, Photographic film

Contents: Experimental cavity ionization, Tissue equivalent ionization chambers, Thermal neutron measurements, Threshold foils for neutron detection, Measurement of fast neutron tissue dose with the Hurst proportional counter, A scintillation dosimeter, Silver-activated phosphate glass microdosimeters for gamma-ray dose measurement, Chemical dosimetry systems, Measurement of depth dose, Film dosimetry.

AD-631 319 Fld. 18/4, 6/18
CFSTI Prices: HC $2.60 MF $0.50
EDGERTON GERMESHAUSEN AND GRIER INC SANTA BARBARA CALIF
DEVELOPMENT OF A READER FOR MINIATURE CONDENSOR IONIZATION CHAMBERS.
Technical rept.,
by A. C. Lucas. Nov 65, 27p. Rept. no. S-296-R, Contract DA-49-146-XZ-408,
AFRRI CR65-7

Unclassified report

Descriptors: (*Ionization chambers, Meters), (*Measuring devices (Electrical + electronic), Design), Tissues (Biology), Simulation, Dosage, Gamma rays, Neutrons, Electrometers

Tissue-equivalent condenser ion chambers of small size were constructed for use in studies of phantoms irradiated with gamma rays and neutrons. An instrument was designed, constructed, and tested that will measure the chamber discharge with high detectability, which is important in the conduct of experiments at long distances from neutron and gamma-ray sources. (Author)

AD-631 341 **See Fld. 18/10**

AD-631 456 **See Fld. 18/8**

AD-631 589 **See Fld. 6/18**

AD-631 709 **See Fld. 20/2**

18/5. NUCLEAR POWER PLANTS

AD-631 631 Fld. 18/5, 18/10
BUREAU OF YARDS AND DOCKS WASHINGTON D C
SOME ASPECTS OF REACTOR SAFETY SYSTEMS,
by Edward C. Wenzinger, Raymond F. Scholl, and Robert E. Fort. 1966, 26p.

Unclassified report

Availability: Published in IEEE Transactions on Nuclear Science vNS13 n1 Feb 1966. Copies to DDC users only.

Descriptors: (*Reactor safety systems, Nuclear power plants), (*Nuclear power plants, Systems engineering), Gates (Circuits), Digital systems, Analog systems, Computer logic, Reactor shutdown, Naval equipment, Reactor fuel rods, Analog-to-digital converters

The importance of system engineering and establishing the levels of safety and availability required for reactor installations are discussed. Safety system logic schemes, operator confidence in the equipment, and protection against the effects of chance failures in safety circuits are considered. The authors suggest that existing reactor safety systems should be examined in light of the philosophical, logical and circuit considerations. Possible component failures should be evaluated on a system effects basis to determine the need for the automatic annunciation of these failures and to provide a measure of the system's capability of providing the required automatic corrective actions and protection against unnecessary plant shutdowns. Since reactor safety systems are a combination of different circuits in which the analog signal at the analog to digital interface is not always displayed, failures are not necessarily annunciated and a cascading of failures is possible. The development of the basic philosophy for these systems is a complex process employing broad and complex technical considerations. (Author)

18/6. RADIATION SHIELDING AND PROTECTION

AD-631 684 Fld. 18/6, 13/10, 6/18
CFSTI Prices: HC $1.00 MF $0.50
DEPARTMENT OF THE NAVY WASHINGTON D C
ASSURING RADIATION SAFETY ABOARD ATOMIC-POWERED SHIPS,
by D. L. Broder, K. K. Popkov, and S. M. Rubanov. 1966, 15p. Rept. no. Trans-2088a, TT 66-61121

Unclassified report

Obespechenie Radiatsionnoi Bezopasnosti na Atomnykh Sudakh, trans. of mono. Biologicheskaya Zashchita Sudovykh Reaktorov, Leningrad, 1964 p306-20.

Descriptors: (*Nuclear powered vessels, Radiation hazards), Nuclear reactors, Nuclear power plants, Fission products, Shielding, Icebreakers, Health physics, Decontamination, Reactor cores, Reactor fuels, USSR

CONTENTS: Sources of radiation from a marine reactor; fundamentals of space arrangement and nature of hygienic measures aboard nuclear-powered ships; principles of decontamination; recharging nuclear fuel.

AD-631 738 Fld. 18/6, 13/10, 21/6
CFSTI Prices: HC $1.00 MF $0.50
DEPARTMENT OF THE NAVY WASHINGTON D C
PRINCIPLES OF DESIGN AND ARRANGEMENT OF BIOLOGICAL SHIELDING IN MARINE REACTORS,
by D. L. Broder, K. K. Popkov, and S. M. Rubanov. 1966, 13p. Rept. no. Trans-2088b,

Unclassified report

Printsipy Proektirovaniya i Komponovki Biologicheskoi Zashchity Sudovykh Reaktornykh Ustanovok, trans. of mono. Biologicheskaya Zashchita Sudovykh Reaktorov, Leningrad, 1964 p321-9.

Descriptors: (*Marine nuclear propulsion, Shielding), (*Nuclear powered vessels, *Shielding), (*Reactor shielding materials, Shipborne), Weight, Nuclear power plants, Light water reactors, Neutron flux, Gamma rays, Attenuation, Reactor shielding, Calculations, USSR

Methods of reducing the weight of biological shielding for shipboard nuclear reactors are discussed. Attention is given to selection of shielding materials, proper arrangement of layers of material, and arrangement of the shielding with respect to the reactor.

18/7. RADIOACTIVE WASTES AND FISSION PRODUCTS

AD-631 341 **See Fld. 18/10**

18/8. RADIOACTIVITY

AD-631 456 Fld. 18/8, 18/4
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF APPLIED PHYSICS
MEASUREMENT OF RADIOACTIVE DISINTEGRATION RATE BY THE COINCIDENCE METHOD,
by A. P. Baerg. 27 Aug 65, 10p.
NRC 8805

Unclassified report

Availability: Published in Metrologia v2 n1 p23-32 Jan 1966. Copies to DDC users only.

Descriptors: (*Radioactive decay, Coincidence counting), (*Coincidence counting, Reviews), Equations, Beta decay, Gamma emission, Decay schemes, Gamma counters, Statistical analysis, Canada

The principles of radioactive disintegration rate measurement by the coincidence method are reviewed. It is shown that the basic equations for complex decay can be translated into formulae suitable for deducing absolute rates from observed counting data without requiring any knowledge of the decay scheme constants. The formulae are generally valid for beta-gamma emitters under conditions attainable in practical 4pi (beta-gamma) coincidence systems. Currently used techniques and various factors which influence the accuracy of measurement are discussed. (Author)

AD-631 529 Fld. 18/8, 13/3, 6/18
CFSTI Prices: HC $7.60 MF $0.75
NAVAL RADIOLOGICAL DEFENSE LAB SAN FRANCISCO CALIF
DEVELOPMENT AND TEST OF A SOD-REMOVAL PROCEDURE FOR MOIST LAWNS CONTAMINATED BY SIMULATED FALLOUT.
Technical rept.,
by William C. Cobbin, and W. Leigh Owen. 11 Apr 66, 77p. Rept. no. USNRDL-TR-965,

Unclassified report

Descriptors: (*Grasses, *Radiological contamination), (*Earth-handling equipment, *Radioactive fallout), Radiological warfare, Simulation, Soils, Urban areas, Decontamination, Civil defense systems

A sod-cutting machine was evaluated for its usefulness in the radiological reclamation of small lawn areas - some of which were confined by sidewalks, trees and buildings. Fallout conditions were simulated by contaminating lawn test areas with radiotraced sand. Nominal particle size ranges of 44-88 microns, 88-177 microns, 177-350 microns and 350-700 microns were used. This fallout simulant was dispersed at nominal concentrations of 25, 50 and 100 g/sq ft, respectively. Reclamation effectiveness of sod cutting was dependent upon machine factors (blade depth), soil characteristics (moisture content) and fallout simulant properties (mass loading). The least effective sod removal results were obtained in confined lawns with high moisture content and heavy rock concentrations. The best sod cutting and removal effectiveness results were obtained on more accessible lawns having less moisture content and only a light concentration of rocks. Simulant particle size was found to have little, if any, effect upon reclamation

218-585 O-66-5

performance either with respect to effort required or removal effectiveness achieved. (Author)

AD-631 747 Fld. 18/8, 20/8
CFSTI Prices: HC $3.60 MF $0.50
RADIATION RESEARCH ASSOCIATES INC FORT WORTH TEX
GAMMA-RAY ENERGY AND ANGULAR DISTRIBUTIONS NEAR THE AIR/GROUND INTERFACE FROM PLANE FALLOUT AND POINT CO60 SOURCES.
Contract rept.,
by R. L. French, and C. W. Garrett. Nov 65, 32p. Rept. no. RRA-M-42,
Contract DA-49-146-XZ-254,
AFRRI CR-65-5
Unclassified report

See also AD-612 030.

Descriptors: (*Gamma rays, Sources), (*Radioactive fallout, *Gamma-ray scattering), Monte Carlo method, Cobalt, Nuclear energy, Distribution

Monte Carlo techniques were applied in a detailed study of the gamma radiation environment three feet above the air/ground interface due to two types of gamma-ray sources: 1) fallout uniformly distributed on the ground surface, and 2) a Co60 point source also three feet above the ground at separation distances of 100 to 800 feet. In each case, the scattered and direct-beam fluxes were computed in each of ten receiver energy intervals between 0.04 and 3.5 Mev and eighteen equal receiver angle intervals between 0 (nadir) and 180 degrees (zenith). All results were integrated over azimuthal angle at the receiver to reflect distribution in polar angle only. The source energy was used as a parameter in the fallout calculations and the results thus computed for each of ten different source energies may be weighted and combined to obtain data for fallout of any desired age. Comparisons of the Monte Carlo data with measured data and with other calculated data, both for fallout and for Co60 point sources, show favorable agreement. (Author)

AD-631 198 **See Fld. 20/8**

AD-631 266 **See Fld. 9/1**

AD-631 278 **See Fld. 20/12**

AD-631 367 **See Fld. 20/12**

AD-631 705 **See Fld. 9/5**

18/10. REACTOR MATERIALS

AD-631 341 Fld. 18/10, 18/4, 18/7
CFSTI Prices: HC $6.00 MF $1.25
MASSACHUSETTS INST OF TECH CAMBRIDGE
NONDESTRUCTIVE ANALYSES OF IRRADIATED MITR FUEL BY GAMMA-RAY SPECTROSCOPY.
Interim scientific rept.,
by Jerry A. Sovka, and Norman C. Rasmussen. Oct 65, 266p. Rept. no. MITNE-64, Scientific-4
Contract AF 19 (604)-7492, Proj. AF-5620, Task 562002,
AFCRL 65-787
Unclassified report

Descriptors: (*Reactor fuels, Non-destructive testing), (*Gamma counters, Design), (*Fission products, Gamma-ray spectra), Semiconductor devices, Nuclear radiation spectrometers, Fission product activity, Neutron flux, Neutron reactions, Germanium, Lithium, Cobalt, Cesium, Rhodium, Niobium, Zirconium

Lithium drifted Ge solid state gamma ray detectors were developed and applied to the problem of nondestructive analysis of spent reactor fuel. The energy resolution of the detector was better than 1% (FWHM) in the 600 to 800 keV range and made possible the identification of gamma rays from Co-134, Cs-137, Rh-106, Nb-95, and Zr-95 in this energy region. Ratios of intensities of these gamma rays were used to determine average flux and irradiation time of the fuel. The burnup was then calculated. Results of these measurements agreed with other independent measurements well within the 10% error assigned. The technique developed provides a useful method for determining the irradiation history of spent reactor fuel that has been operated at low enough temperatures so that fission product migration has not taken place. (Author)

AD-631 631 **See Fld. 18/5**

18/11. REACTOR PHYSICS

AD-631 455 Fld. 18/11, 20/8
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF APPLIED PHYSICS
SLOWING DOWN SPECTRUM AND NEUTRON TEMPERATURE IN A THERMAL NEUTRON FLUX DENSITY STANDARD,
by K. W. Geiger, and L. Van Der Zwan. 17 Sep 65, 5p.
NRC 8802
Unclassified report

Availability: Published in Metrologia v2 n1 p1-5 Jan 1966. Copies to DDC users only.

Descriptors: (*Neutron flux, Standards), Thermal neutrons, Neutron absorption, Neutron spectrum, Neutron reactions, Canada

Epithermal and thermal flux parameters for the thermal flux density standard at the National Research Council were measured to allow a more accurate calculation of activation rates. The epithermal spectrum were found to follow a E to the -0.95 power law where E is the neutron energy. The effective neutron temperature in the irradiation cavity was found to be 42C which is 22C higher than the moderator temperature. A formula to calculate the reaction rate is given. (Author)

Field 19-ORDNANCE

19/1. AMMUNITION, EXPLOSIVES, AND PYROTECHNICS

AD-631 245 **See Fld. 4/2**

19/2. BOMBS

AD-631 795 Fld. 19/2, 20/4, 19/4
CFSTI Prices: HC $4.00 MF $0.75
NAVAL ORDNANCE LAB WHITE OAK MD
STATIC WIND TUNNEL TESTS OF THE M823 RESEARCH STORE WITH SPLIT-SKIRT STABILIZERS,
by F. J. Regan, M. E. Falsui, and J. E. Holmes. 12 Jan 66, 121p. Rept. no. NOLTR-61-89, Aerodynamics Research-160
Unclassified report

Descriptors: (*Bombs, Stabilization systems), Free fall missiles, Stability, Fins, Aerodynamic configurations, Wind tunnels, Model tests, Captive tests, Aerodynamic characteristics, Graphics, Exterior ballistics

The M823 configuration is an instrumented free fall store used in bomb research programs. This report presents the results of static wind tunnel tests for the basic forebody with split-skirt tail stabilizers attached. (Author)

19/3. COMBAT VEHICLES

AD-631 234 **See Fld. 20/11**

AD-631 496 **See Fld. 14/2**

19/4. EXPLOSIONS, BALLISTICS, AND ARMOR

AD-631 327 **See Fld. 14/2**

AD-631 467 **See Fld. 1/3**

AD-631 514 **See Fld. 9/5**

AD-631 787 **See Fld. 7/5**

AD-631 795 **See Fld. 19/2**

Field 20-PHYSICS

20/1. ACOUSTICS

AD-631 300 Fld. 20/1
CFSTI Prices: HC $1.00 MF $0.50
DAVID TAYLOR MODEL BASIN WASHINGTON D C ACOUSTICS AND VIBRATION LAB
SOME NUMERICAL CALCULATIONS OF SOUND RADIATION FROM VIBRATING SURFACES.
Final rept.,
by George Chertock, and Marie A. Grosso. Mar 66, 21p. Rept. no. 2109,
Task 0401,
Unclassified report

Descriptors: (*Numerical analysis, *Sound), (*Vibration, Sound), Pressure, Surfaces, Integral equations, Programming (Computers)

Three particular problems in sound radiation from vibrating surfaces are solved by a method which is based on the numerical solution of the Helmholtz integral equation for the sound pressure at the vibrating surface. Numerical results are given for the near and far field of (1) a circular piston vibrating on the surface of a sphere, (2) the radial pulsations of a finite cylinder, and (3) a narrow zonal piston vibrating on a spheroid. In all cases, the results are considered more accurate than previous values reported in recent literature. (Author)

AD-631 332 Fld. 20/1, 14/2
CFSTI Prices: HC $5.60 MF $0.50
TENNESEE UNIV KNOXVILLE ULTRASONICS LAB
BASIC RESEARCH ON THE PROPERTIES OF MATTER USING ULTRASONIC WAVES.
Technical rept.,
by M. A. Breazeale. Feb 66, 52p. Rept. no. TR-1,
Contract Nonr-4289 (01), Proj. NR-384-306,
Unclassified report

Descriptors: (*Ultrasonic radiation, Scientific research), Physical properties, Liquids, Solids, Surface properties, Water, Brass, Aluminum, Glycerols, Acoustic horns, Transducers, Crystals, Schlieren photography, Equations

CONTENTS: M. A. Breazeale, 'Finite Amplitude Waves in Liquids and Solids', Proceedings of the 5th ICA, Liege, Vol. Ia, D18 (1965). A. L. Van Buren and M. A. Breazeale, 'Distorted Wave Interaction at Boundaries', J. Acoust. Soc. Am. 38, 931 (A) (1965). Charles Ross Endsley III, 'A Study of Devices for the Concentration of Ultrasonic Waves', M. S. Thesis, The University of Tennessee (1965). A. L. Van Buren, 'Wave Interactions at Plane Boundaries'. A. A. Gedroits and V. A. Krasil'nikov, J. Exptl. Theoret. Phys. (USSR), 43, 1592 (1962). M. A. Breazeale and D. O. Thompson, Appl. Phys. Lett., 3, 77 (1963). A. Hikata, B. Chick and C. Elbaum, Appl. Phys. Lett., 3, 195 (1963).

AD-631 460 Fld. 20/1
CFSTI Prices: HC $1.10 MF $0.50
NEW HAMPSHIRE UNIV DURHAM
REFLECTION OF UNDERWATER SHOCK WAVES.
Final summary rept.,
by H. H. Hall. 20 Feb 66, 2p. Contract N600 (19)59507.
Unclassified report

Descriptors: (*Shock waves, Underwater), (*Acoustics, Underwater), Reflection, Underwater sound, Sound transmission, Underwater explosions, Wave functions

Recordings were made of pulse shapes generated underwater by No. 6 Electric Blasting caps, and reflected from the plane interface between water and a 20% salt solution (wave velocity approx. 5620 ft/sec), critical angle with water about 60 degrees, separated by a polyethylene membrane. These records exhibit the general shape and phenomena predicted by the plane wave approximation as a function of angle of incidence --The increase of the reflection coefficient to 100% on approaching the critical angle, the rapid phase shift and inversion of shape, and final complete reversal at grazing incidence. Moreover, the records also show the abrupt arrival of the 'lateral' wave, as well as its shape up to the arrival of the primary pulse. At grazing incidence there appears to be practically complete cancellation of the primary wave by its inverted reflection, for points close to the boundary surface.

AD-631 628 Fld. 20/1, 1/1
CFSTI Prices: HC $5.70 MF $2.50
MICHIGAN UNIV ANN ARBOR ACOUSTICS AND SEISMICS LAB
EXPERIMENTAL STUDY OF SOUND POWER RADIATED FROM COLD MODEL JETS AND GROUND SILENCING ARRANGEMENTS. VOLUME II. APPENDIX III: SOUND POWER DATA IN TABULAR FORM.
Rept. for Dec 62-Jul 64,
by Norman E. Barnett. Jul 65, 57p. Rept. no. 05478-6-F,
Contract AF 33 (657)-8802, Proj. AF-8170, Task 817001,
AFAPL TR-65-55-Vol-2
Unclassified report

See also AD-621 634.

Descriptors: (*Jet engine noise, Countermeasures), Nozzles, Tables, Acoustic properties, Reduction, Sound, Power, Airplane models, Gas flow, Tests, Configuration

The report contains the detailed one-third octave band sound power data for the majority of the complete tests conducted during the research program. The various graphs in the body of the report were abstracted from these tables and the corresponding table numbers are reported on each graph.

AD-631 772 Fld. 20/1
CFSTI Prices: HC $4.00 MF $0.75
NAVAL RESEARCH LAB WASHINGTON D C
A REVIEW OF WORLD CONTRIBUTIONS FROM 1945 TO 1965 TO THE THEORY OF ACOUSTIC RADIATION. CHAPTER III. THEORY OF TRANSIENT RADIATION.
Memo rept.,
by S. Hanish. 10 Mar 66, 104p. Rept. no. NRL-MR-1688,
Unclassified report

See also AD-621 125.

Descriptors: (*Acousties, Propagation), (*Sound, Propagation), Sound transmission, Mathematical analysis, State-of-the-art reviews

Contents: Poisson's solution of the initial value problem; Jordan's lemma; General formulas for the calculation of transient radiation; Transient radiation from a piston membrane - work of Kozina and Makarov; Transient response of a rigid piston in an infinite rigid baffle - work of miles; Indicial impedance of a rigid piston in a rigid infinite baffle; Transient radiation field of a vibrating plate edge clamped in a rigid wall; Transient radiation from large aperture planar radiators - case of short waves; Rectangular 'large aperture radiator' illuminated by a step modulated sinusoidal signal; Rectangular 'large aperture radiator' illuminated by a rectangular pulse modulated sinusoidal signal; Transient radiation from spheres; The polynomials B sub n (jkr sub o) and its laplace inversions; Transient radiation from spheres excited by arbitrary time signals; Characteristic waves of exterior space; Transient excitation of spheres by a sinusoidally modulated step function; Ratio R (k) of initial velocity potential amplitude of transient waves to the velocity potential amplitude of steady state waves in the far field; Transient radiation from a spherical source of order n = O for an impulse excitation; Transient radiation from a spherical source of order n = O for step sinusoid excitation; Tail end of transient radiation from a spherical source of order n = O; Tail end of transient radiation from a spherical source of order n = 1; Transient reaction of medium on a spherical radiator of order n = 1; Theory of sound radiation from moving sources; The transient field from an infinite line source of uniform strength; Transient waves in two dimensions - work of barakat.

AD-631 778 Fld. 20/1, 20/4
CFSTI Prices: HC $2.00 MF $0.50
GOETTINGEN UNIV (WEST GERMANY) PHYSIKALISCHES INSTITUT
INTERACTION BETWEEN AIR FLOW AND AIRBORNE SOUND IN A DUCT.
Scientific rept.,
by P. Mertens. 15 Nov 64, 33p. Rept. no. Scientific-1,
Contract AF 61 (052)-666,
Unclassified report

Descriptors: (*Sound transmission, Gas flow), (*Gas flow, Sound), Airborne, Ducts, Attenuation, Propagation, Acoustic insulation, Absorption

The sound propagation in moving air with locally varying flow velocity is investigated by means of shock waves from a spark discharge. For this purpose the resulting wave front is photographed with a schlieren optics in a flow duct with great flow boundary layer thickness. The results reveal that by this method the known theories of geometrical acoustics can fairly be represented and can experimentally be completed. From the measuring results statements can be made about the favourable design of absorbing flow ducts. The properties of porous absorbers are determined in the presence of an air flow. There a penetration of the absorber by the air flow yields a change of the flow resistance compared with still air. The acoustic flow resistance and the differential static flow resistance are experimentally found to have the same value. Moreover it is proved that turbulent motions along the surface of the absorber do not affect the flow resistance appreciably.

AD-631 800 Fld. 20/1
CFSTI Prices: HC $1.00 MF $0.50
NAVY UNDERWATER SOUND LAB NEW LONDON CONN
ARRAY GAIN FOR THE CASE OF HORIZONTAL NOISE.
Research rept.,
by Benjamin F. Cron, Norbert P. Fisch, and Robert L. Shaffer. 11 Apr 66, 20p. Rept. no. USL-731,
Proj. SF-101-03-15-11285,
Unclassified report

Descriptors: (*Hydrophones, Gain), (*Noise, Correlation techniques), Measurement, Underwater sound, Extremely low frequency

Array gain computations based on spatial correlation measurements in the 200-400-cps band and the directionality of the noise field for center frequencies of 112 and 178 cps are obtained. Both sets of measurements indicate more noise from the horizontal direction than from overhead at low frequencies, whereas the opposite is true at the higher frequencies. The results derived from spatial correlation measurements are compared with theoretical values for a directional noise field and vertical receivers, and the influence of sea conditions on the gain is demonstrated. For all element spacings of the 8-element array and all sea conditions considered, the gain varied from a low of 5 db to a high of 12.5 db. For the case of uncorrelated noise, a value of 9 db is obtained for array gain from 10 log N, where N is the number of elements. The results based on directionality of the noise field are below those based on spatial correlation, and the same trend with increasing wind speed is observed. The data for this calculation were available only for the upper half-plane. (Author)

AD-631 235 See Fld. 8/12

AD-631 354 See Fld. 20/4

AD-631 355 See Fld. 20/4

AD-631 507 See Fld. 20/4

AD-631 620 See Fld. 17/2

AD-631 807 See Fld. 8/10

20/2. CRYSTALLOGRAPHY

AD-631 302 Fld. 20/2, 20/12
CFSTI Prices: HC $1.60 MF $0.50
DELAWARE UNIV NEWARK DEPT OF PHYSICS
INTRINSIC POINT DEFECTS IN CDS.
Technical rept.,
by K. W. Boer. Apr 66, 15p. Rept. no. TR-7,
Contract Nonr-4336 (00)
Unclassified report

See also AD-623 895.

Descriptors: (*Cadmium compounds, Sulfides), (*Single crystals, Degradation), Crystal lattice defects, X rays, Photoconductivity, Semiconductors, Annealing, Low-temperature research, Temperature, Sulfur, Electrical properties

The unambiguous identification of intrinsic defects in semiconductors is essential for understanding the electronic microprocesses involved in luminescence and photoconductivity. Progress has been made in identification of the sulfur vacancy and its influence on electrical properties. The sulfur vacancy was created by x-ray damage above a threshold energy between 250 and 300 keV. In order to minimize the influence of ambient gases, the x-ray damage was done in ultra-high vacuo (p < 5 x 10 to the 10th power torr). A sulfur vacancy is produced adjacent to the surface or low angle boundaries and its production can be impeded by preceding sulfur treatment of the crystal. The analysis of conductivity glow curves shows a level of 0.5 eV below the conduction band for this sulfur vacancy. (Author)

AD-631 335 Fld. 20/2
CFSTI Prices: HC $9.60 MF $0.75
IIT RESEARCH INST CHICAGO ILL TECHNOLOGY CENTER
MECHANICAL RELAXATION OF DEFECTS IN INSULATING CRYSTALS.
Final rept. 1 Feb 65-31 Jan 66,
by P. D. Southgate. Feb 66, 94p. Rept. no. IITRI-B6047-4,
Contract DA-ARO (D)-31-124-G528, Proj. AROD 20014501B32D
AROD 4518:7
Unclassified report

Descriptors: (*Crystal lattice defects, *Relaxation time), Perturbation theory, Impurities,

Internal friction, Magnesium compounds, Oxides, Calcium compounds, Fluorides

Experimental and theoretical studies of problems in the anelastic losses due to point defects and dislocations in insulating crystals are described. Papers covering experimental work are included as appendices. (Author)

AD-631 382 Fld. 20/2, 7/4
CFSTI Prices: HC $1.00 MF $0.50
GEORGIA INST OF TECH ATLANTA ENGINEERING EXPERIMENT STATION
X-RAY DIFFRACTION STUDIES OF THERMAL MOTIONS IN CRYSTALS.
Quarterly progress rept. no. 26, 1 Sep-31 Dec 65, by R. A. Young. 11 Mar 66, 6p. Contract NOnr-991 (00),NOnr-991 (06) Proj. NR-017-623,
Unclassified report

See also AD-624 823.

Descriptors: (*Crystals, *X-ray diffraction analysis), (*Thermal stresses, Crystals), Silicon, Germanium, Temperature, Crystal lattice defects, Crystal structure

Measurements were made on germanium and silicon samples to determine the temperature dependence of X-ray diffracted intensity without changing the temperature. The expected results were calculated by the method of Demarco and Weiss (Acta Cryst. 19:68 (1965)); to eliminate uncertainties in the measurements of incident intensity, the results for each crystal were normalized to the predicted value at one point. The measurements on silicon demonstrate a much larger variation from the predictions than do those of germanium. The 777 of germanium continues to show an anomaly relative to the other hhh planes but that this anomaly is not present in the silicon measurements. This method of measurement does not show a significant difference due to variations in dislocation density. Three of the silicon samples which were measured are to be submitted for fast neutron radiation damage. Sample no. 5 will be exposed to determine the damage versus integrated flux with x-ray integrated intensity measurements being made periodically during the exposure. It appears probable that the total exposure may be about 5 x 10 to the 21st power nvt. The two larger ('monochromator') crystals will eventually be exposed to a degree dependent on the results of the no. 5 sample.

AD-631 709 Fld. 20/2, 20/14, 18/4
CFSTI Prices: HC $3.60 MF $0.50
NAVAL RADIOLOGICAL DEFENSE LAB SAN FRANCISCO CALIF
THE NONPROPORTIONAL RESPONSE OF A NAI (TL) CRYSTAL TO DIFFRACTED X RAYS,
by Thomas H. Jones. 24 Feb 66, 37p. Rept. no. USNRDL-TR-985,
Task 0501,
Unclassified report

Descriptors: (*Sodium compounds, Chlorides), (*Chlorides, Scintillation), Crystals, Thallium, Photons, Nonlinear systems, X-ray diffraction analysis, Radioactivity

Measurements have been made of the scintillation efficiency of a NaI (T) crystal for diffracted X rays in the energy range from 24.7 to 46.5 keV in 1 keV increments. The maximum deviation from linearity occurred in the region from 33 to 35 keV. The nonproportional response of NaI (T) to electrons in the regions from 0.051 to 45.426 keV was then derived using a model of the energetic electron array produced in the crystal by the incident diffracted X rays. (Author)

AD-631 765 Fld. 20/2, 11/2
CFSTI Prices: HC $1.00 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
THE CRYSTAL STRUCTURE OF THE NEW SILICON CARBIDE POLYMORPH 69R,
by Kuo Chang-ling. 15 Mar 66, 7p. Rept. no. FTD-TT-65-692,
TT 66-61122
Unclassified report

Edited trans. of K'o Hsueh T'ung Pao (Chinese People's Republic) n5 p459-61 1964.

Descriptors: (*Silicon compounds, Carbides), (*Carbides, Crystal structure), Crystals, China

The 69R polymorph is one of the 32 silicon carbide polymorphs recently discovered by us. The space group is R3m and the unit cell is hexagonal with cell dimensions: a = 3.0806 A; c = 173.85 A; z = 69. This new polymorph was discovered in crystals prepared by three laboratory sublimation methods and in two industrial silicon carbide crystal plates. They all pair with the fundamental type 6H. The five ways of pairing are: 6H + 69R + 87R, 6H + 69R + .., 6H + 21R + 39R + 69R, 6H + 69R and 6H + 15R + 15R + 69R. The crystals are thin, almost hexagonal plates, 3 x 3 microns in size and about 0.2-1.0 micron thick. For 69R there are more than a hundred thousand ways of close stacking. Based on the known SiC structural analyses and considering the characteristics of the SiC crystal structure, it is possible to form the zigzag sequence from two or three of the pairs of numbers. These two or three pairs come from the eight pairs 22, 21, 23, 32, 33, 34, 43 and 44. Between twenty and a hundred different zigzag sequences can be formed from two numerical pairs, and several hundred kinds from three pairs. The crystal structure of polymorph 69R can be represented by the zigzag sequence (33333332)3.

AD-631 792 Fld. 20/2, 20/12, 11/6
GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND DEVELOPMENT CENTER
A STUDY OF LOW-TEMPERATURE FAILURES IN HIGH-PURITY IRON SINGLE CRYSTALS,
by D. S. Tomalin, and D. F. Stein. 19 Apr 65, 8p. Rept. no. Reprint-5322,
Contract DA-31-124-ARO (D)-95,
AROD 4074:4
Unclassified report

Availability: Published in Transactions of the Metallurgical Society of Aime v233 p2056-62 Dec 1965. Copies to DDC users only.

Descriptors: (*Single crystals, Cryogenics), (*Iron, Single crystals), Fracture (Mechanics), Crystal growth, Grain boundaries, Deformation, Oxygen, Impurities, Failure (Mechanics), Brittleness

The effect of reducing oxygen to low concentrations on the fracture of high-purity iron single crystals has been examined at 78 and 20K. It is found that iron single crystals grown by the strain-anneal method usually contain a few occluded grain boundaries which may become embrittled in the presence of oxygen, thereby nucleating cleavage fractures. High purity with respect to interstitial elements was found to inhibit twinning and evidence is presented for an orientation dependence of the resolved yield stress. Deformation occurred by slip rather than twinning at both temperatures of testing with elongations of as much as 9 pct at 20K. (Author)

AD-631 818 Fld. 20/2, 20/12
CARNEGIE INST OF TECH PITTSBURGH PA DEPT OF ELECTRICAL ENGINEERING
THE EPITAXIAL GROWTH OF GE ON SI BY SOLUTION GROWTH TECHNIQUES,
by J. P. Donnelly, and A. G. Milnes. 13 Oct 65, 2p. Contract DA-31-124-ARO (D)-131,
AROD 3397:13
Unclassified report

Availability: Published in Journal of the Electrochemical Society v113 n3 p297 8 Mar 66. Copies to DDC users only.

Descriptors: (*Germanium, *Epitaxial growth), Silicon, Substrates, Solutions, Semiconductors, Surface properties, Crystal lattice defects, Tin

AD-631 228 See Fld. 20/6

AD-631 236 See Fld. 8/12

AD-631 237 See Fld. 8/12

AD-631 317 See Fld. 20/12

AD-631 407 See Fld. 13/8

AD-631 511 See Fld. 7/4

AD-631 543 See Fld. 11/6

AD-631 612 See Fld. 20/12

AD-631 698 See Fld. 20/12

AD-631 727 See Fld. 5/1

AD-631 744 See Fld. 20/12

AD-631 819 See Fld. 20/12

AD-631 820 See Fld. 20/12

20/3. ELECTRICITY AND MAGNETISM

AD-631 201 Fld. 20/3
CHICAGO UNIV ILL INST FOR THE STUDY OF METALS
MAGNETOSTRICTION OF NIF2.
Technical rept.,
by Karl Haefner, J. W. Stout, and C. S. Barrett. 1966, 2p. Rept. no. tr-17,
Contract Nonr-2121 (13)
Unclassified report

Supported in part by Army Research Office (Durham), NSF, AND ARPA.

Availability: Published in Journal of Applied Physics v37 n1 p449-50 Jan 1966. Copies to DDC users only.

Descriptors: (*Nickel compounds, *Magnetostriction), Fluorides, Single crystals, Crystal lattices, Nuclear spins

From the data the magnetostriction of NiF2 in the (100) direction at 21.4K is lambda (100) = 0.00013. A calculation of the classical dipole interaction energy in NiF2, combined with an estimate of the elastic constants shows that this contribution to the magnetostriction is smaller by a factor of one hundred than that observed. In NiF2 a homogeneous distortion in the (100) direction would in the first approximation raise the crystal field energy of the Ni (++) ions on one sublattice and lower that of those on the other sublattice by an equal amount. The principal axes of the crystal field of both sublattices would, however, change somewhat in direction and possibly this effect, together with consideration of the balance between antiferromagnetic exchange energies and crystalline field energies which determines the canting angle between the spins on the two sublattices, may account for the observed magnetostriction. (Author)

AD-631 202 Fld. 20/3
CHICAGO UNIV ILL INST FOR THE STUDY OF METALS
MAGNETIC SUSCEPTIBILITY OF SINGLE CRYSTAL FECL2 PARALLEL AND PERPENDICULAR TO THE TRIGONAL AXIS.
Technical rept.,
by J. W. Stout, Carl L. Brandt, and Charles Trapp. 1965, 1p. Rept. no. TR-15,
Contract Nonr-2121 (13)
Unclassified report

Supported in part by NSF.

Availability: Published in Low Temperature Physics-LT9 pt-B p887 1965. Copies to DDC users only.

Descriptors: (*Iron compounds, Chlorides), (*Magnetic properties, Iron compounds), Single crystals, Low-temperature research, Nuclear spins, Ferromagnetism, Antiferromagnetism

The magnetic susceptibilities of single crystals of FeCl2 were measured over the temperature range from 1.2 to 300K. Both the parallel and perpendicular susceptibilities show peak values at 24K, in qualitative agreement with the results of earlier investigators. The peak value of the parallel susceptibility is 1.05 cu cm/mole and that of the perpendicular susceptibility is 0.2406 cu cm/mole. At 1.3K, the parallel susceptibility is 0.0104 cu cm/mole and the perpendicular susceptibility is 0.178 cu cm/mole. The unusual drop in the perpendicular susceptibility below the Neel temperature, as well as the other features of the susceptibility curve, are quantitatively explained by a calculation in which the positions of the one-atom electronic levels are determined by the spin-orbit coupling constant and a trigonal field parameter which splits the t (2g) orbital states. The ferromagnetic interactions between Fe (++) ions in a layer and the antiferromagnetic interactions between ions in adjacent layers are approximated by molecular fields. (Author)

AD-631 297 Fld. 20/3, 20/12
CFSTI Prices: HC $11.60 MF $0.75
CARNEGIE INST OF TECH PITTSBURGH PA DEPT OF ELECTRICAL ENGINEERING
AN INVESTIGATION OF SUPERCONDUCTIVE FILMS OF TIN IN THE ELECTRIC INTERMEDIATE STATE AND SOME APPLICATIONS,
by Thomas D. English,Jr.. Apr 63, 119p. Contract Nonr-760 (09)
Unclassified report

Descriptors: (*Superconductivity, *Films), (*Tin, Films), Cryogenics, Magnetic fields, Resistance (Electrical), Intermediate frequency, Amplifiers, Thermometers, Magnetism, Flux meters, Vacuum apparatus, Vapor plating

The electric properties of vacuum deposited films of tin in the superconductive electric intermediate state (EIS) are investigated experimentally. Sample currents and magnetic fields have been employed over the frequency range from d.c. to 6,000 cycles per second. Films which have been cut in the shape of filamentary mazes have been used in this work. The over-all characteristics of these films are summarized by means of a phase diagram, which indicates the regions of applied magnetic field and temperature within which the films are in the superconductive state, the EIS, or in the normal state. Over a comparatively wide range of the experimentation, the voltage across the sample can be related to the temperature and the applied magnetic field by a simple exponential relationship. The properties of magneto-resistive amplifiers, thermometers, and gauss meters which are based on the operation of the films in the EIS, are examined theoretically and experimentally. The significance of the magnetic and thermal widths of the EIS is discussed in relation to the choice of operating ranges for the devices. (Author)

AD-631 346 Fld. 20/3, 13/10
CFSTI Prices: HC $8.60 MF $0.75
ARMOUR RESEARCH FOUNDATION CHICAGO ILL
STATE OF THE ART IN ELECTROMAGNETIC INTERFERENCE APPLIED TO PROBLEMS OF THE BUREAU OF YARDS AND DOCKS.
Final rept., Phases II and III.
Aug 61, 90p. Contract NBy-24936, Proj. ARF-E120,
Unclassified report

See also AD-431 126.

Descriptors: (*Interference, *Electromagnetic waves), Radio waves, Radio signals, Analysis, Measurement, Design, Specifications, Instrumentation, Distribution, Military facilities, Naval shore establishments, Shielding, Electric wire, Magnetic fields

Investigations were conducted regarding the adequacy of RFI specification MIL-I-16910A to which the Bureau of Yards and Docks must currently adhere (Phase II) and the suitability of the instrumentation program currently in force (Phase III). A specification objective applicable to the Bureau's responsibilities with respect to the control of electromagnetic interference (EMI) was arrived at. Recommendations were made concerning permissible interference limits on non-military frequencies, limits for magnetic field strength, a method for measuring conducted interference along electrical wires, a simplified measurement procedure, and the acquisition of Naval vehicles. The instrumentation phase evaluated typical commercial EMI measuring instruments as to their adequacy in fulfilling the Bureau's responsibilities in the detection and measurement of interference. An investigation was conducted regarding the extent and type of instrumentation which would be compatible with the intensity of interference problems confronting BuDocks. A suggested instrumentation program is presented along with desirable instrument characteristics. (Author)

AD-631 596 Fld. 20/3, 14/2, 9/2
MITRE CORP BEDFORD MASS
HALL EFFECT B-H LOOP RECORDER FOR THIN MAGNETIC FILMS.
Revised ed.,
by David A. Berkowitz, and Manfred A. Schippert. 18 Oct 65, 6p. Contract AF 19 (628)-2390, Proj. AF-508,
ESD TR-65-109
Unclassified report

Revision of manuscript submitted 11 May 65.

Availability: Published in Journal of Scientific Instruments v43 p56-7 Jan 1966. Copies to DDC users only.

Descriptors: (*Magnetic materials, Films), (*Magnetic properties, Recording systems), (*Hall effect, Recording systems), Evaporation, Magnetic recording systems, Magnetic fields, Computer storage devices, Hysteresis

An instrument for recording B-H loops of evaporated magnetic films is described. A Hall effect probe is used to measure the normal component of magnetic field at the film surface along an edge of the film. The instrument is arranged also to record a map of the normal field over the area of the film in isometric projection form. The field maps indicate the uniformity of the domain structure when the film is in a partially switched state. (Author)

AD-631 743 Fld. 20/3, 20/9
CFSTI Prices: HC $1.00 MF $0.50
ARKANSAS UNIV FAYETTEVILLE PLASMA LAB
RESEARCH ON ENERGY TRANSFER PROBLEMS IN SUPERCONDUCTORS AND FLOWING PLASMAS.
Quarterly progress rept., 1 Oct-31 Dec 65,
by Denys O. Akhurst. 31 Dec 65, 9p. Rept. no. UAPL-26,
Contract DA-01-021-AMC-12820 (Z)
Unclassified report

Descriptors: (*Superconductors, Energy), (*Plasma medium, Energy), Superconductivity, Circuits, Magnetohydrodynamic generators, Inductance, Shock tubes

A summary is given of progress in work involving: Analysis of energy extraction in superconductors; survey of magnetohydrodynamic power generation; shock tube verification of interaction theory.

AD-631 298 **See Fld. 9/1**

AD-631 316 **See Fld. 7/4**

AD-631 317 **See Fld. 20/12**

AD-631 473 **See Fld. 9/4**

AD-631 515 **See Fld. 13/8**

AD-631 533 **See Fld. 11/6**

AD-631 569 **See Fld. 20/9**

AD-631 626 **See Fld. 7/4**

AD-631 636 **See Fld. 9/1**

AD-631 712 **See Fld. 5/1**

20/4. FLUID MECHANICS

AD-631 209 Fld. 20/4
CFSTI Prices: HC $1.00 MF $0.50
NAVAL ORDNANCE TEST STATION CHINA LAKE CALIF
DRAG-REDUCING FLUIDS IN A FREE TURBULENT JET.
Research rept.,
by Donald N. Jackley. Apr 66, 24p. Rept. no. NOTS-TP-4062,
Task RUTO-3E-000/216-1/R109-01-03, NAVWEPS 9053
Unclassified report

Descriptors: (*Jets, Turbulence), (*Turbulence, Drag), (*Drag, Reduction), Damping, Walls, Boundary layer, Polymers, Shear stresses, Lubricants, Nozzles, Additives, Fluids

To determine whether drag reduction is the result of turbulence dampening per se, the decay characteristic of a free turbulent jet was investigated. The work was suggested by recent boundary-layer studies showing that fluid drag reduction is caused by the presence of high-molecular-weight polymers in solution. The jet, having all the properties associated with turbulence except those caused by the presence of a wall, provided an ideal tool for the experiment. It was found that in a water solution of drag-reducing polymer, shear stress was reduced in the nozzle but not in the free jet. Drag reduction was therefore concluded to be a phenomenon of the wall because the character of the turbulence that is beyond the influence of the wall resembles the character of the turbulence in a free jet, which was found to be unaffected by the drag-reducing agent. (Author)

AD-631 286 Fld. 20/4
CFSTI Prices: HC $1.00 MF $0.50
SYRACUSE UNIV RESEARCH INST N Y DEPT OF MECHANICAL AND AEROSPACE ENGINEERING
IINTERACTION OF CONCENTRATED VORTICITY WITH AN ADVANCING SHOCK AND EXPANSION WAVE.
Final rept.,
by Darshan S. Dosanjh. Mar 66, 12p. Rept. no. ME-931-1256-6603-F,
Contract DA-ARO (D)-31-124-G210,DA-ARO (D)-31-124-G615 Proj. DA-009925001,DA-20014501B33G
AROD 3242:6
Unclassified report

Descriptors: (*Shock waves, *Vortices), Experimental data, Airfoils, Aerodynamic characteristics, Sound

Results of the experimental and analytical investigations on (i) Interaction of an advancing shock

218-585 O-66-6

front and a starting vortex flow field, (ii) Interaction of an advancing shock front and a vortex street flow field and (iii) Interaction of a rectilinear circular vortex flow field with a progressing expansion wave, are summarized. The experimental phase of these investigations was conducted in a shock tube and the transient interaction data were recorded using spark shadowgraph, schlieren and interferometric techniques. The observed distortion of the advancing reflected shock front, the transmitted (interacted) vortex flow field and the characteristics of a growing acoustic wave front generated as a result of reflected shock-vortex interaction were recorded and analyzed. Theoretical analyses of (a) generation of sound front due to shock-vortex interaction (b) the non-steady interaction of a rectilinear circular flow field with an advancing expansion wave, were accomplished. (Author)

AD-631 287 Fld. 20/4
CFSTI Prices: HC $3.00 MF $0.75
SYRACUSE UNIV RESEARCH INST N Y DEPT OF MECHANICAL AND AEROSPACE ENGINEERING
INTERACTION OF A RECTILINEAR CIRCULAR VORTEX FLOW FIELD WITH A PROGRESSING EXPANSION WAVE.
Interim technical rept.,
by Gene K. Baxter, and Darshan S. Dosanjh.
Mar 66, 61p. Rept. no. ME-931-6603-IT,
Contract DA ARO (D)-31-124-G210,DA-ARO (D)-31-124-G615 Proj. DA-009925001 ,DA-20014501B33G
AROD 3242:5

Unclassified report

Descriptors: (*Vortices, *Shock waves), Particles, Fluid flow, Numerical analysis, Digital computers, Axially symmetric flow, Scattering

A theoretical analysis of the non-steady interaction of a rectilinear circular vortex flow field with a progressing expansion wave is developed. The expansion wave was assumed to remain linear throughout the interaction. The analysis describes the non-steady behavior of a single particle from the potential region of the vortex flow field as it passes through the expansion wave and the analysis is then extended to describe the behavior of any fluid curve selected from the original circular streamlines of the vortex flow field. The solution of the interaction problem was found by using standard numerical analysis procedures and the numerical solution was then programmed and performed on an IBM 7074/1460 digital computer/plotter system. The major effect of the interaction is found to be a linear stretching of the vortex flow field coupled with an asymmetric skewing effect which decreases with increasing radius from the vortex core. The numerical solution was qualitatively evaluated and found to give results which are physically valid for the portion of the vortex flow field in which the magnitude of the radial vortex pressure gradient is smaller than the magnitude of the pressure gradient of the expansion wave during the time of interaction. (Author)

AD-631 312 Fld. 20/4
CFSTI Prices: HC $3.00 MF $0.75
BALLISTIC RESEARCH LABS ABERDEEN PROVING GROUND MD
CALCULATIONS FOR AIR FLOWS IN DISSOCIATION EQUILIBRIUM,
by Nathan Gerber, and Joan M. Bartos. Nov 65, 60p. Rept. no. BRL-R-1306,
Proj. RDT/E-1A222901A201,

Unclassified report

Descriptors: (*Gas flow, Dissociation), (*Chemical equilibrium, Gas flow), Stagnation point, Hypersonic flow, Supersonic flow, Axially symmetric flow, Shock waves, Two-dimensional flow, Mathematical analysis, Air

Results of calculations carried out for a model of air in dissociation equilibrium are presented in graphical form. The quantities computed are (1) flow variables (including species concentrations) behind normal and oblique shock waves, (2) flow variables in axisymmetric conical flow fields, (3) stagnation point values of flow variables on the 'stagnation' streamline behind two-dimensional and axisymmetric detached shock waves, and (4) flow variable gradients at the shock wave on stagnation streamlines. Computations are given for free stream temperatures of 273.16K and 300K, free stream pressures of 1.0, .1, .01, .001, and .0001 atmospheres, and a range of initial Mach numbers and cone angles to provide flow field temperatures in the range 3000K - 10,000K. Brief derivations of the equations employed are given. The present calculations are oriented toward application in experiments in hypersonic flow with ground facilities such as shock tubes and ballistic ranges. In addition, they furnish important supplementary information to theoretical studies of nonequilibrium flows. (Author)

AD-631 313 Fld. 20/4
CFSTI Prices: HC $4.60 MF $0.50
AEROSPACE RESEARCH LABS OFFICE OF AEROSPACE RESEARCH WRIGHT-PATTERSON AFB OHIO
ON THE DETERMINATION OF OPTIMUM SUPERSONIC THRUST NOZZLES OF GIVEN LENGTH FOR A FLOW WITH SWIRL: THEORETICAL PART.
Scientific rept.,
by Karl G. Guderley, and Daniel Tabak. Jan 66, 46p. Rept. no. ARL-66-0013,
Proj. AF-7071,

Unclassified report

Descriptors: (*Supersonic nozzles, Thrust), (*Thrust, Optimization), Determination, Geometric forms, Numerical analysis, Axially symmetric flow

The problem of maximizing the thrust in supersonic nozzles of given length has been treated previously by Guderley and Rao. Significant differences of the nozzle shapes may be encountered if the oncoming flow possesses a swirl around the axis of symmetry. The present paper extends the existing theory to this case. The final procedure turns out to be more complex, but the basic considerations carry over to the present case. Some space has been devoted to a discussion of a short cut by which Rao succeeded in by-passing the characteristic conditions. The report contains the basic theory only. (Author)

AD-631 329 Fld. 20/4
CFSTI Prices: HC $4.00 MF $1.00
DOUGLAS AIRCRAFT CO INC LONG BEACH CALIF AIRCRAFT DIV
STUDY OF A GENERAL METHOD SOLUTION TO THE INCOMPRESSIBLE TURBULENT BOUNDARY LAYER EQUATIONS,
by A. M. O. Smith, N. A. Jaffe, and R. C. Lind.
11 Nov 65, 127p. Rept. no. LB-52949,
Contract NOw-64-0352c,

Unclassified report

Descriptors: (*Turbulent boundary layer, *Incompressible flow), (*Partial differential equations, Numerical methods + procedures), Boundary layer

This work is an attempt to develop a general method of solution to the mean (time averaged) flow equations governing the turbulent boundary layer. The problem of incompressible flow is considered as an initial step towards the solution of the more general problem of compressible flow. In the approach adopted, once the Reynold's shear stress is formulated in terms of an eddy viscosity, no further approximations are made. The accuracy of the eddy viscosity can be assessed only by comparison of the calculated results with experimental data. An eddy viscosity formulation believed to incorporate the latest knowledge on turbulent boundary layers has been made. Calculations have been made for a considerable number of flows and comparison with experimental data indicates that the present formulation has produced remarkably accurate solutions. However, there do exist disagreements in regions of high adverse pressure gradients which warrant further study and perhaps modification of the present eddy viscosity formulation. At this time the work is mostly of scientific value. That is, it answers the question of what can be accomplished by accurate calculations employing the eddy viscosity concept. A practical working method has not yet been attained. Calculations are so involved that large computing times are required; one hour being necessary for some of the more difficult problems.

AD-631 354 Fld. 20/4, 20/1
CFSTI Prices: HC $1.60 MF $0.50
GOETTINGEN UNIV (WEST GERMANY) PHYSIKALISCHES INSTITUT
INTERACTION BETWEEN AIR FLOW AND AIRBORNE SOUND IN A DUCT.
Final technical rept. 1 Dec 62-31 Jan 63,
by F. P. Mechel, P. A. Mertens, and W. M. Schilz. 1 Feb 63, 18p. Contract AF 61 (052)-112, Proj. AF-7231, Task 71787,

Unclassified report

Descriptors: (*Gas flow, *Sound signals), (*Ducts, Physical properties), Airborne, Propagation, Acoustic impedance, Orifices, West Germany

The interaction of a surface bending wave with the flow boundary layer is of practical interest. Several types of surfaces conducting bending waves suitable for boundary layer interaction are tested. For the investigation of the influence of the flow velocity profile in a ducton the sound attenuation the sound pressure profiles in a wide duct with flow were measured. The acoustic impedance of an absorber with flow along its surface was measured. The sound radiation from an orifice with flow discharge depends on the flow velocity. The reflection coefficient of the orifice increases with flow velocity. It depends strongly on the turbulence level of the jet behind the orifice. (Author)

AD-631 355 Fld. 20/4, 20/1
CFSTI Prices: HC $7.60 MF $0.75
GOETTINGEN UNIV (WEST GERMANY) PHYSIKALISCHES INSTITUT
INTERACTION BETWEEN AIR FLOW AND AIRBORNE SOUND IN A DUCT.
Annual summary rept. no. 3, 1 Dec 61-30 Nov 62,
by F. P. Mechel, P. A. Mertens, and W. M. Schilz. 30 Nov 62, 74p. Contract AF 61 (052)-112, Proj. AF-7231, Task 71787,

Unclassified report

Descriptors: (*Gas flow, *Sound signals), (*Ducts, Physical properties), Airborne, Flate plate models, Acoustic impedance, Orifices, West Germany

The development of the flow boundary layer of a flat plate is influenced by different sound fields. In one series of measurements the sound field affects the flow at the stagnation point of the plate, in another series the boundary layer itself is affected. Depending on the frequency of the sound signal and on the flow velocity boundary layer distortions are either increased or suppressed. The cross distribution of the sound pressure in an absorbing duct with air flow is determined by the shape of the flow velocity profile. For a downstream -propagating sound signal the sound pressure is increased at the absorbing wall even for sound wavelengths greater than the flow boundary layer thickness. The acoustic radiation impedance of a tube orifice with an air outflow depends on the flow velocity and the turbulence level. With increased flow velocity the radiation resistance is decreased. (Author)

AD-631 381 Fld. 20/4, 3/2
CHICAGO UNIV ILL
ON THE ONSET OF CONVECTIVE INSTABILITY,

by N. R. Lebovitz. 3 May 65, 3p. Contract AF-AFOSR-712-65 ,AF-AFOSR-62-136 AFOSR 66-0193

Unclassified report

Availability: Published in The Astrophysical Journal v142 n3 p1257-60 Oct 1 1965. Copies to DDC users only.

Descriptors: (*Convenction, *Stability), Potential theory, Fluid mechanics, Astrophysics, Equations of motion

AD-631 393 Fld. 20/4
STANFORD UNIV CALIF DEPT OF AERONAUTICS AND ASTRONAUTICS
A THEORETICAL STUDY OF NON-EQUILIBRIUM BLUNT-BODY FLOWS,
by Raul J. Conti. 26 May 65, 24p. Contract AF 49 (638)-1280, Proj. AF-9781, Task 978101, AFOSR 66-0620

Unclassified report

Availability: Published in Journal of Fluid Mechanics v24 pt1 p65-88 1966. Copies to DDC users only.

Descriptors: (*Nonequilibrium flow, *Blunt bodies), (*Wake, Nonequilibrium flow), Series, Perturbation theory, Stagnation point, Integration, Differential equations, Dissociation, Recombination reactions, Oxygen, Nitrogen, Frozen equilibrium flow

Non-equilibrium inviscid flows behind a spherical -segment shock wave are investigated with the method of series truncation. This semi-analytical technique developed at Stanford is based on a systematic co-ordinate -perturbation scheme. The flow variables are expanded in series in powers of the longitudinal curvilinear co-ordinate leading away from the stagnation point. The problem is thus reduced to one of numerical integration of ordinary differential equations for functions of the normal co-ordinate. Unlike the similar situation of the Blasium series in boundary-layer theory, the present scheme--having to deal with elliptic equations--must resort to series truncation. As a consequence, a truncation error is introduced. The paper shows a simple way of reducing this error. The simplified air chemistry adopted is based on non-equilibrium dissociation and recombination of oxygen diluted in inert nitrogen. A wide spectrum of non-equilibrium regimes is investigated for a fixed set of flight conditions. In particular, near-frozen flows are followed to the vicinity of the stagnation point through a region of large temperature and concentration gradients located near the body. This equilibrium-drive region, arising from the singular nature of the frozen limit, is studied in some detail. (Author)

AD-631 401 Fld. 20/4
CFSTI Prices: HC $9.60 MF $0.75
AEROSPACE RESEARCH LABS OFFICE OF AEROSPACE RESEARCH WRIGHT-PATTERSON AFB OHIO
FLOW IN A DELAVAL NOZZLE BY THE GARABEDIAN METHOD.
Scientific rept.,
by John V. Armitage. Jan 66, 92p. Proj. AF-7071,
ARL 66-0012

Unclassified report

Descriptors: (*Laval nozzles, Nozzle gas flow), (*Nozzle gas flow, Mathematical analysis), Partial differential equations, Programming (Computers), Mathematical prediction, Subsonic flow, Transonic flow, Supersonic flow, Axially symmetric flow

The problem of computing the flow in a deLaval nozzle when an initial velocity is specified along the axis of symmetry is considered. Fortran II programs are presented for computing the flow pattern in the subsonic region, for extrapolating the data to the sonic line, for extrapolating from the sonic line into the supersonic region, and for extending the computation into the supersonic region. (Author)

AD-631 431 Fld. 20/4
CFSTI Prices: HC $1.10 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
NOZZLE FOR ACCELERATION OF A TWO-PHASE STREAM,
by V. D. Venediktov. 23 Mar 66, 6p. Rept. no. FTD-TT-65-1738,

Unclassified report

Unedited rough draft trans. of Patent (USSR) 167 205, appl. 843805/24-6, 24 Jun 63.

Descriptors: (*Two-phase flow, Nozzles), (*Nozzles, Design), (*Nozzle gas flow, Acceleration), Patents, USSR

The object of the invention is a nozzle for the acceleration of a two-phase stream containing a narrowing, a throat, and an expanding section which is distinguished by the fact that for the purpose of obtaining a uniform structure of the stream in the narrowing section there is located a deflector the walls of which are parallel to the flow of the corking liquid, and the plane of the output section is disposed in the plane of the throat section. (Author)

AD-631 474 Fld. 20/4
CFSTI Prices: HC $2.60 MF $0.50
PRINCETON UNIV N J GAS DYNAMICS LAB
PRELIMINARY STUDIES OF THE FLOW AROUND TWO-DIMENSIONAL BODIES AT HIGH MACH NUMBERS AND LOW REYNOLDS NUMBERS.
Scientific interim rept.,
by S. M. Bogdonoff, and I. E. Vas. Jan 66, 31p. Rept. no. 754,
Contract AF 49 (638)-1271, Proj. AF-7064,
ARL 66-0006

Unclassified report

Descriptors: (*Hypersonic flow, *Leading edge), Shock waves, Stagnation point, Wind tunnels, Boundary layer, Flat plate models, Reynolds number, High-pressure research, Temperature

The studies were primarily concentrated on the leading edge region where the shock wave and the viscous region caused by the body itself interact. The studies were carried out at a Mach number of about 24. In a hot nitrogen wind tunnel operating at stagnation pressures of 2000-5000 lb/sq.in. and at stagnation temperatures to 2700 K., results were obtained for values of the interaction parameter from 60-250. In this region, results were obtained on a flat plate with leading edge thicknesses which varied from a fraction of a mean free path to hundreds of mean free paths. The detailed pressure distributions obtained over the body seemed to indicate significant deviations from the strong interaction theory, falling considerably below the theoretical results. Exploratory studies of the details of the flow field in this region indicate that the simple one-dimensional Rankine-Hugoniot equations cannot be used across the shock wave. A new tool for study of this region indicates shock profiles which show the changes in the structure of the phenomenon as one approaches the leading edge. (Author)

AD-631 477 Fld. 20/4
CFSTI Prices: HC $3.60 MF $0.50
AEROSPACE RESEARCH LABS OFFICE OF AEROSPACE RESEARCH WRIGHT-PATTERSON AFB OHIO
RAREFACTION EFFECTS ON IMPACT PRESSURE PROBES IN HYPERSONIC FLOW,
by Fred L. Daum, J. S. Shang, and G. A. Elliot. Sep 65, 35p. Rept. no. ARL-65-176, Proj. AF-7064 ,AF-7065

Unclassified report

Descriptors: (*Hypersonic flow, Pressure), (*Superaerodynamics, Hypersonic flow), Impact shock, Blunt bodies, Tests, Probes

An experimental investigation of impact pressure behavior was conducted at elevated hypersonic Mach numbers and low Reynolds numbers. The results clearly indicated a Mach number dependence of the impact pressure characteristics. It was demonstrated that at constant Reynolds number, the impact pressure ratio increases systematically with increasing Mach number in the 'fully merged' flow regime. It was found that no single parameter would adequately correlate the data throughout the complete range of test conditions. However, verification of the existence of a hypersonic similarity parameter for the blunt body was demonstrated over the test Reynolds number range of 50 to 350. A qualitative explanation of the observed pressure behavior has been suggested based on an assumed physical model. It appears that the continuum approach to theoretical blunt body flows could be further extended into the rarefied flow regime through proper analytical treatment of the rarefaction effects on the bow shock wave. (Author)

AD-631 506 Fld. 20/4
CFSTI Prices: HC $5.60 MF $0.50
SOUTHAMPTON UNIV (ENGLAND) DEPT OF AERONAUTICS AND ASTRONAUTICS
RESEARCH IN BOUNDARY LAYER OSCILLATIONS AND NOISE.
Summary rept.,
by E. J. Richards. Jun 62, 52p. Rept. no. AASU-220,
Contract AF 61 (052)-358,

Unclassified report

Descriptors: (*Turbulent boundary layer, Scientific research), Acoustics, Pressure, Excitation, Statistical analysis, Great Britain

AD-631 507 Fld. 20/4, 20/1
CFSTI Prices: HC $5.60 MF $0.50
SOUTHAMPTON UNIV (ENGLAND) DEPT OF AERONAUTICS AND ASTRONAUTICS
SOME RESULTS OF EXPERIMENTAL INVESTIGATIONS OF THE SURFACE PRESSURE FIELD DUE TO A TURBULENT BOUNDARY LAYER.
Technical note,
by M. K. Bull, and J. L. Willis. Nov 61, 56p. Rept. no. AASU-199,TN-1
Contract AF 61 (052)-358,

Unclassified report

Descriptors: (*Turbulent boundary layer, *Pressure), (*Jet plane noise, Turbulence), Correlation techniques, Statistical data, Boundary layer, Spectroscopy, Probability, Skin friction, Pressure gages, Surface properties, Analysis of variance

Experimental results for the space-time correlations of the fluctuating pressure field of a turbulent boundary layer are given, and an empirical representation of the pressure field suitable for structural response calculations is presented. Variation with Mach number of r.m.s. pressure as a function of skin friction is given for Mach numbers up to about 1.6. The probability distribution of the pressure fluctuations at a fixed point in the field is found to approximate closely to Gaussian. The acoustic power output from a boundary layer on a larger boundary surface is obtained. Spectra of boundary layer noise in tow jet aircraft are presented and compared with the spectrum of the boundary layer excitation. (Author)

AD-631 521 Fld. 20/4, 1/1
CFSTI Prices: HC $6.00 MF $1.50
SOUTHAMPTON UNIV (ENGLAND) DEPT OF AERONAUTICS AND ASTRONAUTICS

WALL PRESSURE FLUCTUATIONS IN BOUNDARY LAYER FLOW AND RESPONSE OF SIMPLE STRUCTURES TO RANDOM PRESSURE FIELDS.
Final rept.,
by M. K. Bull, J. F. Wilby, and D. R. Blackman.
Jul 63, 287p. Rept. no. AASU-243,
Contract AF 61 (052)-358, Proj. AF-1471, Task 147102,

Unclassified report

Descriptors: (*Pressure, *Turbulent boundary layer), Turbulence, Boundary layer transition, Statistical functions, Walls, Panels (Structural), Flat plate models, Acoustics, Great Britain

Results are presented for r.m.s. pressure, spectra and broad and narrow band space-time correlations of the wall pressure field of a turbulent boundary layer and of correlations between wall pressure and longitudinal velocity fluctuations. Preliminary results of some similar measurements in the laminar-turbulent transition region of a boundary layer are also given. The report also includes results of measurements of panel response to turbulent boundary layer, jet and siren excitation.

AD-631 549 Fld. 20/4
PURDUE RESEARCH FOUNDATION LAFAYETTE IND
AN EXPERIMENTAL INVESTIGATION OF INCOMPRESSIBLE FLOW IN CONICAL DIFFUSERS.
Revised ed.,
by A. T. McDonald, and R. W. Fox. 19 Aug 65, 17p. Contract DA-31-124-ARO (D)-138,
AROD 4332:3

Unclassified report

Prepared in cooperation with California Univ., Davis. Revision of manuscript submitted 29 Jun 65.

Availability: Published in Internationanl Journal of Mechanical Sciences v8 p125-39, 1966. Copies to DDC users only.

Descriptors: (*Diffusers, *Incompressible flow), Conical bodies, Design, Geometric forms, Plastics, Kinetic energy, Flow visualization, Performance (Engineering), Stalling

Experiments were performed in clear-plastic diffusers, using water flow discharging into a plenum tank, to obtain performance and flow-regime information for a wide range of conical diffuser geometries. A line of first appreciable stall was located with sufficient precision that it is useful in conical diffuser design. Performance data obtained allow solution of the four common optimum problems encountered in diffuser design. At present these results can be extrapolated only with caution to diffuser geometries other than those tested. (Author)

AD-631 556 Fld. 20/4
CFSTI Prices: HC $3.00 MF $0.75
PISA UNIV (ITALY) INST OF AERONAUTICS
AERODYNAMIC INTERACTION EFFECTS OF A SUPERSONIC AXISYMMETRIC JET EXHAUSTING BELOW A FLAT PLATE INTO A SUPERSONIC FREE STREAM.
Final rept.,
by Enrico Pistolesi, and Marino Marini. May 65, 54p. Contract AF-EOAR-97-63,

Unclassified report

Descriptors: (*Jets, *Supersonic flow), Aerodynamics, Axially symmetric flow, Flat plate models, Supersonic characteristics, Drag, Interference, Italy

The interference effect in a supersonic stream between a supersonic jet and a flat plate near it is studied by means of the linearized theory. The characteristics of a supersonic axisymmetric jet issuing from a duct in a supersonic stream are first obtained. The effects of the flow around the jet on a flat plate disposed at some finite distance from the jet discharge section are studied, showing the difficulties of an exact calculation and the possibilities to obtain some approximate results. (Author)

AD-631 562 Fld. 20/4
CFSTI Prices: HC $2.60 MF $0.50
POLITECNICO DI TORINO (ITALY) ISTITUTO DI MECCANICA APPLICATA
THE SUPERFICIAL RE-EMISSION LAW IN A FREE-MOLECULE FLOW.
Technical note,
by Silvio Nocilla. Sep 62, 28p. Rept. no. TN-21,T.N. 1
Contract AF 61 (052)-511,
AFOSR 3780

Unclassified report

Descriptors: (*Superaerodynamics, Emissivity), (*Emissivity, Molecular beams), Molecular properties, Gases, Mathematical analysis, Distribution, Italy

The object of the research is a study of the validity of the re-emission model. According to such a re-emission model, the re-emitted molecules behave as a gas in Maxwellian equilibrium, subject to a thermal agitation and moreover to a translation motion. The space distribution law is established for the molecules re-emitted from an elementary rectangular surface and from an indefinite strip of elementary thickness. The obtained theoretical results are then compared with Hurlbut's experimental results obtained by nitrogen molecular beams impinging on lithium fluoride crystals. The comparison allows one to establish the values of two fundamental parameters referred to the re-emitted gas. (Author)

AD-631 564 Fld. 20/4
CFSTI Prices: HC $1.60 MF $0.50
POLITECNICO DI TORINO (ITALY) ISTITUTO DI MECCANICA APPLICATA
A COMPARISON BETWEEN THEORY AND EXPERIMENT ON FREE MOLECULAR FLOW.
Technical note,
by Silvio Nocilla. Apr 63, 11p. Rept. no. TN-24,T.N. 4
Contract AF 61 (052)-511,
AFOSR 485

Unclassified report

Descriptors: (*Superaerodynamics, Emissivity), Experimental data, Theory, Gases, Temperature, Scattering, Italy

The paper is devoted to a comparison between the theoretical re-emission law proposed by the Author in previous papers and the recent experimental results of Smith and Fite. The comparison enables us to determine time by time the values of the basic parameters s sub r and theta sub r and shows that assuming these values the agreement between theory and experiment is very good. (Author)

AD-631 565 Fld. 20/4
CFSTI Prices: HC $1.60 MF $0.50
POLITECNICO DI TORINO (ITALY) ISTITUTO DI MECCANICA APPLICATA
RESEARCHES ON FREE MOLECULE FLOW, TURBULENT BOUNDARY LAYER, DISSOCIATION. KINETICS AND SHOCK STRUCTURE FOR GASEOUS MIXTURES, PERFORMED AT THE INSTITUTE OF APPLIED MECHANICS-POLITECNICO DI TORINO - ITALY.
Final rept.,
by Carlo Ferrari. Mar 63, 12p. Contract AF 61 (052)-511,
AFOSR 4771

Unclassified report

Descriptors: (*Superaerodynamics, Scientific research), (*Dissociation, Reaction kinetics), (*Turbulent boundary layer, Scientific research), (*Shock waves, Gases), Mixtures, Thermodynamics, Italy

AD-631 598 Fld. 20/4, 20/13
CFSTI Prices: HC $2.00 MF $0.50
PRINCETON UNIV N J GAS DYNAMICS LAB
AERODYNAMIC DRAG AND HEAT TRANSFER FOR FLOW PAST TWO-DIMENSIONAL BODIES AT HIGH KNUDSEN NUMBERS.
Scientific interim rept.,
by D. Roger Willis, and P. Taub. Jan 66, 44p. Rept. no. 726,
Contract AF 49 (638)-1271, Proj. AF-7064, ARL 66-0007

Unclassified report

Prepared in cooperation with California Univ., Berkeley, Contract Nonr-22 (45).

Descriptors: (*Drag, Superaerodynamics), (*Heat transfer, Superaerodynamics), (*Superaerodynamics, Aerodynamic characteristics), Iterative methods, Cylindrical bodies, Flat plate models, Wedges, Perturbation theory, Knudsen number

Using the integral iteration method, theoretical results are obtained for aerodynamic drag and heat transfer in the nearly free molecular regime. The geometries considered are: circular cylinders, inclined flat plates, and wedges, all two dimensional. Perturbation to the free molecular results are obtained correct to order (1/Kn) ln Kn only (Kn is the Knudsen number). The free stream speed ratio is greater than two and the body temperatures range from free stream to recovery. The results are similar to those obtained previously for a normal flat strip, except that for small angle wedges and flat strips at small angles of attack, the drag coefficient is predicted to exceed the free molecular value. (Author)

AD-631 599 Fld. 20/4
AERONAUTICAL RESEARCH INST OF SWEDEN STOCKHOLM
THEORETICAL AND EXPERIMENTAL INVESTIGATION OF SECOND-ORDER SUPERSONIC WING-BODY INTERFERENCE.
Revised ed.,
by Marten Landahl, Georg Drougge, and Beverly Beane. 12 Dec 59, 9p. Contract AF 61 (052)-75,
AFOSR 3438

Unclassified report

Prepared for presentation at the Phenomena of Transonic and Supersonic Flow Session, IAS National Summer Meeting, Los Angeles, June 16-19, 1959.

Availability: Published in Journal of the Aerospace Sciences Sep 1960. Copies to DDC users only.

Descriptors: (*Wing-body configurations, *Supersonic characteristics), Interference, Theory, Wind tunnels, Aerodynamic configurations, Wings, Sweden

Approximate second-order solutions for the supersonic flow around wing body combinations are calculated, using two different theoretical models. In the first, the spanwise curvature of the body field is assumed small and the wing sweep small in comparison with that of the Mach cone. In the second, two perpendicular intersecting two-dimensional fields are considered. The analysis is restricted to such high Mach numbers that M to the minus 2nd power is much smaller than 1, and an approximate formula common to the two models is then found for the second-order interference term. This formula can also be used to correct experimental pressure distributions for the effect of nonuniformities in the wind-tunnel flow. In order to test the theory, wind-tunnel experiments on nonlifting cone-cylinder bodies in combination with wings of simple shapes were performed. Pressure distributions were measured at M = 3 and M = 4, both around the bodies and on the wings separately, as well as in combination, and it was found that the second-order interference was predicted reasonably well by the simplified theory. (Author)

AD-631 630 Fld. 20/4
CFSTI Prices: HC $1.00 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
METHOD OF CALCULATING THREE-DIMENSIONAL SUPERSONIC GAS FLOWS AROUND BODIES,
by Z. D. Zapryanov, and V. B. Minostsev. 30 Sep 65, 10p. Rept. no. Trans-1552,
Contract NOw-62-0604-c,
TT 66-61110
Unclassified report

Trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika i Mashinostroenie, n5 p20-4 1964.

Descriptors: (*Supersonic flow, Mathematical analysis), Aerodynamic configurations, USSR, Two-dimensional flow, Three-dimensional flow

The first section contains a description of the calculation of two-dimensional flows, the second of three-dimensional flows, and the third section contains the results of calculation of flow over a number of specific bodies. The method of characteristics is widely used to calculate supersonic regions of two-dimensional flows.

AD-631 649 Fld. 20/4, 14/2
CFSTI Prices: HC $12.60 MF $0.75
DEFENSE RESEARCH LAB UNIV OF TEXAS AUSTIN
EXPERIMENTAL INVESTIGATION OF THE SURFACE IMPACT PRESSURE PROBE METHOD OF MEASURING LOCAL SKIN FRICTION AT SUPERSONIC SPEEDS.
Master's thesis,
by Charles Joe Stalmach,Jr., Jan 58, 124p. Rept. no. DRL-410,CF-2675
Contract NOrd-16498, Task UTX-1,
Unclassified report

Descriptors: (*Skin friction, *Supersonic flight), Pressure gages, Probes, Compressible flow, Wind tunnels, Experimental data, Pressure, Impact shock, Surface properties, Boundary layer

The purpose of the report is to demonstrate, on the basis of wind tunnel results, the feasibility of using a surface probe. This phase is limited to thermally insulated surfaces with zero pressure gradient.

AD-631 701 Fld. 20/4
CFSTI Prices: HC $2.00 MF $0.50
DAVID TAYLOR MODEL BASIN WASHINGTON D C HYDROMECHANICS LAB
CAVITATION STUDY OF A PROPELLER OPERATING IN A NONUNIFORM FLOW CREATED BY A WIRE GRID SCREEN.
Final rept.,
by Gary C. Comstock. Mar 66, 33p. Proj. S-R009-01-01, Task 0101,
DTMB 2185
Unclassified report

Descriptors: (*Cavitation, *Propellers (Marine)), (*Wake, Simulation), Wire, Fluid flow, Model tests, Ship hulls

Tunnel test results are presented for nonuniform flow cavitation studies of a 4-bladed subcavitating propeller. The nonuniform flows were generated by wire mesh screens located upstream from the propeller. The first objective of the tests was to compare the cavitation of the propeller operating in a given axial wake as produced by a wire mesh with the cavitation in the same wake as reported by van Manen. The second objective was to determine the effect on the propeller cavitation of modifying the axial inflow velocity so as to obtain the same local inflow angles as produced by both the axial and tangential wake of the ship. Differences were observed in the cavitation patterns produced by the wakes with and without tangential component correction, but the expected transverse asymmetry was not consistently observed. The cavitation patterns in the uncorrected wake agreed well with those observed by van Manen except that the intensity varied suggesting that the cavitation index used in the two studies may not be equivalent. (Author)

AD-631 734 Fld. 20/4
CFSTI Prices: HC $11.60 MF $0.75
BROWN UNIV PROVIDENCE R I DIV OF ENGINEERING
THE RAYLEIGH PROBLEM IN A RADIATING COMPRESSIBLE GAS. PART I: PLATE MACH NUMBER FINITE,
by Alexander Solan, and Ira M. Cohen. Mar 66, 114p. Rept. no. 10,
Contract Nonr-562 (35), Proj. NR-061-132,
Unclassified report

Descriptors: (*Compressible flow, Heat transfer), (*Flat plate models, Compressible flow), (*Rayleigh scattering, Compressible flow), Viscosity, Mathematical analysis

The flow of a compressible, viscous, heat-conducting, radiating gray gas near a flat plate set impulsively in motion in its own plane is considered and solved in certain limiting cases. The problem is formulated for general values of the Boltzmann number Bo (convection -radiation ratio). The plate Mach number is assumed to be sufficiently large so that a significant amount of heat is generated by dissipation but not so large that the orders of magnitude of the thermophysical properties are changed. Asymptotic expansions are made for large ratio of the photon to molecular mean free path, N, taking into account the effect of Bo. In the limit N approaching infinity, with Bo finite and plate temperature equal to the temperature of the gas at rest, the asymptotically optimal scalings split the problem into an optically thin, compressible, viscous boundary layer with radiative emission but no self-absorption and an optically finite, inviscid, acoustic flow with full radiative interaction. The inviscid region beyond the boundary layer may be treated at the acoustic level because the velocity transverse to the plate is small compared with that parallel to the plate, and because the energy transported by radiation is small since the boundary layer is very thin even though it may be emitting quite intensively. The equations in the boundary layer and in the inviscid region are solved numerically for several representative cases. It is found that the velocity profile in the boundary layer is only weakly affected by radiation. (Author)

AD-631 737 Fld. 20/4, 20/13
CFSTI Prices: HC $2.00 MF $0.50
PRINCETON UNIV N J GAS DYNAMICS LAB
THEORY OF THERMAL CONDUCTANCE IN A COLLISIONLESS GAS,
by Yau Wu. Jun 65, 31p. Rept. no. 746,
Contract AF 49 (638)-1271 ,NSF-GK-59
Unclassified report

Descriptors: (*Thermal conductivity, Theory), (*Gases, Thermal conductivity), Equations of state, Mathematical analysis, Invariance

The theory of thermal conductance in a collisionless gas in an arbitrary closed system has been developed. The pressure, density, temperature and isotropicity (I) in the system are not uniformly distributed in general, but PI/square root of T and n square root of TI are invariants throughout the whole region according to the revised theory of thermal transpiration developed recently by Wu. The thermal conductance has been defined as a matrix in a multi-component system. It is not only linearly dependent on the mean density in the system at a given temperature distribution on the boundary, but also depends on the geometry and the reflection law on the boundary of the system. Several geometries have been considered, such as triangular parallel plates, cubes, polygons, polygonal parallel plates and others. A similarity law has been established showing equivalence among the systems of different geometries. (Author)

AD-631 749 Fld. 20/4
CFSTI Prices: HC $2.60 MF $0.50
TECHNISCHE HOCHSCHULE AACHEN (WEST GERMANY) INSTITUT FUER MECHANIK
GENERATION OF TURBULENCE IN COUETTE FLOW BETWEEN EXCENTRIC CYLINDERS.
Technical rept.,
by F. Schultz-Grunow. Mar 62, 25p. Contract AF 61 (052)-303,
Unclassified report

Descriptors: (*Couette flow, *Turbulence), (*Cylindrical bodies, Couette flow), Boundary layer, Stability, Perturbation theory, Inertia, Flow separation, Integrals, Reynolds number, West Germany

AD-631 750 Fld. 20/4
CFSTI Prices: HC $2.60 MF $0.50
TECHNISCHE HOCHSCHULE AACHEN (WEST GERMANY) INSTITUT FUER MECHANIK
GENERATION OF TURBULENCE IN COUETTE FLOW BETWEEN EXCENTRIC CYLINDERS.
Annual summary rept. no. 1, Oct 59-Apr 61,
by F. Schultz-Grunow. Jun 61, 24p. Contract AF 61 (052)-303,
ARL 142
Unclassified report

Descriptors: (*Couette flow, *Turbulence), (*Cylindrical bodies, Couette flow), Stability, West Germany, Flow separation, Vortices, Reynolds numbers

AD-631 754 Fld. 20/4
CFSTI Prices: HC $2.00 MF $0.50
COMPAGNIE DE RECHERCHES ET D'ETUDES AERONAUTIQUES (FRANCE)
CONTROL OF CIRCULATION AROUND A CIRCULAR CYLINDER.
Final technical rept. 1 Dec 62-30 Nov 63,
by Jean Brocard. 20 Jan 64, 27p. Contract AF 61 (052)-653,
Unclassified report

Descriptors: (*Fluid mechanics, *Cylindrical bodies), Wind tunnel models, Tests, France

AD-631 769 Fld. 20/4, 20/13, 21/5
CFSTI Prices: HC $1.00 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
STUDY OF THE PROCESS OF EXPANSION OF FREON-12 IN A NOZZLE,
by T. M. Sutyrina. 15 Mar 66, 9p. Rept. no. FTD-TT-65-1033,
TT 66-61126
Unclassified report

Unedited rough draft trans. of Kholodilnaya Tekhnika (USSR) n4 p45-51 1964.

Descriptors: (*Freons, Thermal expansion), (*Nozzle gas flow, Freons), Gas turbine nozzles, Supercooling, Refrigerants, Thermodynamics, USSR

AD-631 776 Fld. 20/4
TECHNION - ISRAEL INST OF TECH HAIFA DEPT OF AERONAUTICAL ENGINEERING
THEORY FOR TWO-DIMENSIONAL SUPERSONIC LAMINAR BASE PRESSURE, USING THE CROCCO -LEEXS MIXING CONCEPTS,
by J. Rom. 12 Jan 62, 10p. Contract AF 61 (052)-576,
Unclassified report

Proceedings of the Annual Conference on Aviation and Astronautics (4th), Feb 62.

Availability: Published in The Bulletin of the Research Council of Israel v11C n1 p35-44 Apr 1962. Copies to DDC users only.

Descriptors: (*Wake, Laminar flow), (*Laminar flow, Two-dimensional flow), (*Base flow, Pressure), (*Supersonic flow, Laminar flow), Theory, Flow separation, Reynolds number, Control, Israel

The Crocco-Lees theory is applied to the two dimensional laminar wake. The wake is divided into two regions. An essentially constant static pressure region existing right behind the base, and a recompression region in which the external flow decelerates to the upstream Mach number. The base pressure is found to be dependent on the upstream Mach number and on two Reynolds number dependent parameters. The results of the analysis enable the correlation of existing two dimensional base pressure data and offer an insight into the mechanism controlling the base pressure. (Author)

AD-631 805 Fld. 20/4
CFSTI Prices: HC $3.00 MF $0.75
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
DEFORMED SPHEROIDS IN STOKES FLOW.
Technical memo.,
by V. O'Brien. Jul 65, 63p. Rept. no. TG-716, Contract NOw-62-0604-c.
Unclassified report

Descriptors: (*Bodies of revolution, *Incompressible flow), Spheres, Ellipsoids, Viscosity, Equations of motion, Numerical analysis, Perturbation theory, Deformation

A short, straightforward program has been developed for the numerical calculation of viscous flow solutions for arbitrary closed bodies of revolution. Flow solutions have been computed for a variety of body shapes. Results compared well with analytic theory where it exists, but for many bodies there has been no theoretical investigation. (Author)

AD-631 808 Fld. 20/4
CFSTI Prices: HC $2.00 MF $0.50
MARYLAND UNIV COLLEGE PARK INST FOR FLUID DYNAMICS AND APPLIED MATHEMATICS
DIVERGENT TRANSPORT COEFFICIENTS AND THE BINARY COLLISION EXPANSION.
Technical note,
by L. K. Haines, J. R. Dorfman, and M. H. Ernst. Oct 65, 40p. Rept. no. BN-419, Contract DA-AROD-31-124-G676 ,AF-AFOSR-141-65
AROD 407:69
Unclassified report

Descriptors: (*Transport properties, *Gas flow), Molecular beams, Kinetic theory, Disks

The binary collision expansion for the viscosity of a two dimensional gas of hard disks is discussed. A divergence appears in the first correction to the Boltzmann equation result. The calculations presented here are exact and free of the difficulties that appear in the earlier discussion of Kawasaki and Oppenheim. The coefficient of the divergence is computed and found to be precisely the same as that found by Sengers by an entirely different method. The origin of the divergence is shown to be exactly the same as that found by Dorfman and Cohen. (Author)

AD-631 339 **See Fld. 20/9**

AD-631 370 **See Fld. 12/2**

AD-631 371 **See Fld. 20/13**

AD-631 379 **See Fld. 20/9**

AD-631 429 **See Fld. 5/1**

AD-631 547 **See Fld. 20/9**

AD-631 563 **See Fld. 7/4**

AD-631 569 **See Fld. 20/9**

AD-631 647 **See Fld. 14/2**

AD-631 715 **See Fld. 21/5**

AD-631 727 **See Fld. 5/1**

AD-631 778 **See Fld. 20/1**

AD-631 795 **See Fld. 19/2**

AD-631 821 **See Fld. 14/2**

20/5. MASERS AND LASERS

AD-631 499 Fld. 20/5, 20/12, 20/6
CFSTI Prices: HC $3.00 MF $0.75
THOMAS J WATSON RESEARCH CENTER YORKTOWN HEIGHTS N Y
INJECTION LASER STUDY.
Rept. no. 8, 1 Jun 63-31 May 65 (Final),
by K. Konnerth, F. F. Morehead, F. Stern, P. R. Wagner, and K. Weiser. 31 May 65, 79p. Contract DA-36-039-AMC-02349 (E), Proj. DA-1P622001A056, Task 1P6-22001A05603,
Unclassified report

Descriptors: (*Lasers, *Diodes (Semiconductor)), Injection, Gallium alloys, Arsenic alloys, Carriers (Semiconductors), Semiconductors, Single crystals, Pumping (Electronics), Electron beams, Light, Amplifiers, Crystal growth, Cadmium alloys, Tellurium alloys, Electroluminescence

Many GaAs injection laser diodes show a substantial delay between the application of a current pulse and the onset of lasing if they are operated near room temperature and at currents just above threshold. A model for this effect based on trapping of carriers gives good agreement both with the delay results and with experimental data on the time dependence of spontaneous emission for currents below threshold, provided that the density of trapping states is about ten times the threshold carrier concentration. No independent evidence for the existence of these states has been obtained. The dependence of current and light emission on voltage in CdTe diodes was studied. The current varies as exp (qV/2kT) at low current levels, and as exp (qV/kT) at higher current levels. Emission is observed with photon energies considerably greater than the applied voltage. Thermodynamic considerations restrict the efficiency of such radiation from one-step processes, and account in part for the low quantum efficiency found at room temperature. In GaAs structures with a high-resistance p-type layer surrounded by high-conductivity p-type layers, ambipolar negative resistance, efficient light emission, and lasing were observed. The origin of the electrons is thought to be avalanching in the strong electric field found to present in these all p-type structures.

AD-631 583 Fld. 20/5, 9/2, 1/2
CFSTI Prices: HC $1.10 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
SOVIET LASERS.
23 Mar 66, 6p. Rept. no. FTD-TT-65-1953,
Unclassified report

Trans. of Wojskowy Przeglad Loticzy (Poland) n4 p86-7 1965.

Descriptors: (*Lasers, USSR), (*Computers, Air transportation), Poland, Meteorological parameters

The following Soviet lasers, presumably on exhibit at the Leipzig fair, are mentioned. A laser with 100-mv power attainable with one hundred millionth part of a second: for detection of cosmic ships in space and for heating plasma. Laser GOR-100, with an unignited light ray that burns holes in steel plates. Razdan laser, operating continuously at 2 light pulses/sec. Laser OK-1, a ruby laser whose thousandth part of a second ray welds the unstuck retina of the eye. SU-1 device that microwelds the parts of precision apparatus that melt with difficulty. The Lucz-3 miniature semiconductive device that transforms solar light into electricity which in turn is transformed into amplifier laser light. The computer device at Manhasset in New York State computes from meteorological data the best routes for travel between Europe and America.

AD-631 767 Fld. 20/5, 9/4, 20/13
CFSTI Prices: HC $3.00 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
INFORMATION THEORY AND THE THERMODYNAMICS OF MASERS,
by R. S. Ingarden, 15 Mar 66, 57p. Rept. no. FTD-TT-65-899, TT 66-61124
Unclassified report

Edited trans. of Postepy Fizyki (Poland) v15 n3 p287-322 1964.

Descriptors: (*Masers, *Thermodynamics), (*Information theory, Thermodynamics), Kinetic theory, Entropy, Electromagnetic fields, Communication theory, Probability, Statistical mechanics, Algebras, Stochastic processes, Lasers, Theory, Poland

Contents: Maxwell's 'demon'; Szilard's solution; The concept of information according to Shannon; An axiomatic definition of information; The homogeneous case; The variational principle in generalized thermodynamics; Application in mathematical statistics; The thermodynamics of masers. ('Maser' is used here in the generic 'Molecular amplification by stimulated emission of radiation' sense, not 'Microwave amplification...').

AD-631 813 Fld. 20/5, 20/6
UTAH UNIV SALT LAKE CITY DEPT OF PHYSICS
NEW LASER TRANSITIONS IN IODINE-INERT GAS MIXTURES,
by R. C. Jensen, and G. R. Fowles. 14 Sep 64, 1p.
Unclassified report

Supported in part by NSF and USAF.

Availability: Published in Proceedings IEEE v8250 n2 p345 Nov 1964. Copies to DDC users only.

Descriptors: (*Lasers, *Helium group gases), (*Iodine, Lasers), Gases, Mixtures, Discharge tubes, Radiofrequency power, Excitation, Electric discharges, Optics, Quantum mechanics

The purpose of this communication is to report eleven new laser transitions obtained in mixtures of iodine and noble gases. Laser action was achieved in the following manner: A small amount (approx. 0.1 torr) of iodine vapor was admitted into a discharge tube and then helium added to a total pressure of about 4 torr. Maximum output was obtained with pulses of about 10 kv. Maximum output was obtained by pumping down the above mixture to approximately 2 torr and exciting the discharge with about 100 w of RF Power in addition to the 10 kv pulses and by pumping down the above mixture to about 0.1 torr and exciting the discharge with 15 kv pulses and 300 w of RF power.

AD-631 517 **See Fld. 20/9**

AD-631 546 **See Fld. 9/3**

AD-631 611 See Fld. 7/4

AD-631 711 See Fld. 20/12

20/6. OPTICS

AD-631 228 Fld. 20/6, 20/2
NAVAL ORDNANCE TEST STATION CHINA LAKE CALIF
ULTRASONIC TREATMENT OF SPECIMENS IN THE ELECTRON MICROSCOPE.
Research rept.,
by B. Langenecker. 26 Aug 65, 8p. Rept. no. NOTS-TP-4073,
Task RRMA-24-051/216-1/R007-01-01, NAVWEPS 9059
Unclassified report

Availability: Published in The Review of Scientific Instruments v37 n1 p103-6 Jan 1966. Copies to DDC users only.

Descriptors: (*Metallic crystals, Crystal lattice defects), (*Ultrasonic radiation, Metals), (*Electron microscopy, Ultrasonic radiation), Damping, Aluminum

A method and technical details are described for direct observation of effects of high amplitude ultrasonic stress waves on dislocations in metal crystals. The technique combines, for the first time, ultrasonic treatment at high acoustic energy densities (up to 10 to the 9th power ergs/cu cm at frequencies between 30 and 100 kc), observation of damping of stress waves, and electron microscopy. Results from this in situ technique allow fundamental refinement of pesent theories on ultrasonic activation of dislocation mechanisms. (Author)

AD-631 315 Fld. 20/6, 5/9
CFSTI Prices: HC $2.00 MF $0.50
DAYTON UNIV OHIO RESEARCH INST
GONIOPHOTOMETER TO MEASURE DIFFUSION CHARACTERISTICS OF REAR PROJECTION SCREENS.
Final rept., Dec 64-Oct 65,
by Edgar A. Smith, Guy S. Williams, and Henry T. Mohlman. Dec 65, 28p. Contract AF 33 (615)-2348, Proj. AF-1710, Task 171007, AMRL TR-65-207
Unclassified report

Descriptors: (*Photometers, Motion picture screens), Goniometers, Diffusion, Training devices, Light, Display systems

A goniophotometer was developed for use in measuring the diffusion characteristics of rear projection screen materials. Rear projection screens provide a wide range of possible diffusion characteristics. Similarly, different applications require different characteristics. The goniophotometer will facilitate the selection of screens most suitable for a particular application. Primary components of the device include a light tight chassis, a light source mounted on an arm which can be rotated plus or minus 60 degrees, a holder for screen specimens, a specifically designed photometer, and two interior ambient light panels and associated interior foot candle meters. Schematics, wiring diagrams, and drawings necessary for the fabrication of additional units are included. (Author)

AD-631 676 Fld. 20/6, 20/10, 20/12
CFSTI Prices: HC $3.60 MF $0.50
MITHRAS INC CAMBRIDGE MASS
RESONANT HARMONIC GENERATION AND NON-LINEAR OPTICS.
Final technical status rept. no. 2, 1 Oct 64-30 Sep 65,
by Charles S. Naiman, Jack Schwartz, and Jacques Ducuing. 30 Sep 65, 33p. Rept. no. MC-63-96-R2,
Contract AF 49 (638)-1464, AFOSR 66-0701
Unclassified report

See also AD-617 960.

Descriptors: (*Harmonic generators, *Optics), (*Resonance absorption, Harmonic generators), Nonlinear systems, Crystals, Lasers, Quantum mechanics

Enhancement of the coefficient, X (2), of optical second harmonic generation by resonant absorption is discussed. In particular the conditions under which the resulting increase in X (2) overcomes any losses due to the linear absorptions so introduced are developed. Trivalent rare earth dopants in crystalline hosts of suitable symmetry, among other feasible materials, are examples of materials shown capable of efficient harmonic generation. Experimental techniques are developed for use in measuring and testing the relevant material properties, among them the use of stimulated Raman effect methods for shifting the frequencies of available laser sources. The theory of harmonic generation in absorbing materials is discussed plus the variation in measurement techniques required in experimental studies of these materials. (Author)

AD-631 796 Fld. 20/6, 7/4
CFSTI Prices: HC $4.00 MF $1.00
TENNESSEE UNIV KNOXVILLE DEPT OF PHYSICS
AN INVESTIGATION OF THE EFFECT OF MULTIPLE ABSORPTION AND EMISSION OF RESONANCE-LINE PHOTONS ON LINE SHAPE AND LINE INTENSITY,
by Gene W. Ray, William E. Deeds, and Alvin H. Nielsen. Feb 66, 137p. Rept. no. Scientific-2. Contract AF 19 (628)-4323, Proj. AF-8603, Task 860303, AFCRL 66-96
Unclassified report

Descriptors: (*Photons, Scattering), (*Line spectrum, Photons), Band spectrum, Absorption spectrum, Continuous spectrum, Intensity, Emissivity, Monte Carlo method, Resonance, Hydrogen compounds, Fluorides, Chemical bonds, Vibration, Rotation

The purpose of the study was to investigate the effect of multiple absorption and emission of resonance-line photons on pressure-broadened line shapes and intensities and to determine if this effect could explain the experimentally observed deviations from Lorentz theory. A Monte-Carlo method was used to follow photons step by step through an absorption cell. The effect of multiple scattering on line intensities was determined over a wide range of cell geometries and maximum absorption coefficients and was found to be over 10% for the usual experimental conditions. Line Shapes were calculated for several HF rotation-vibration lines, with the actual parameter values and cell geometries used in an experimental study. Comparison with the observed line shapes indicates that multiple scattering certainly accounts for some of the observed deviations from Lorentz shape. Also, it was found that experimentally determined half-widths and maximum absorption coefficients can be seriously in error. (Author)

AD-631 411 See Fld. 5/1

AD-631 427 See Fld. 17/8

AD-631 499 See Fld. 20/5

AD-631 579 See Fld. 20/10

AD-631 580 See Fld. 4/1

AD-631 666 See Fld. 5/10

AD-631 727 See Fld. 5/1

AD-631 813 See Fld. 20/5

20/7. PARTICLE ACCELERATORS

AD-631 586 Fld. 20/7
CFSTI Prices: HC $1.10 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
LABORATORY AND DEMONSTRATION HEAVY-PARTICLE ACCELERATORS,
by G. I. Kuzmenko. 13 Apr 66, 8p. Rept. no. FTD-HT-66-191, TT 66-61107
Unclassified report

Unedited rough draft trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Fizika (USSR) n4 p174-5 1965.

Descriptors: (*Particle accelerators, Operation), (*Proton accelerators, Operation), Alpha particles, Nuclear reactions, Deuterium, Neutrons, USSR

Proton Accelerator-Discharger: The proton tube with a lithium target makes possible checking the relationship E = mc squared by measuring the scattering of alpha particles in the nuclear reaction between lithium and hydrogen to give helium. The identification of alpha particles with the aid of a scintillation counter is accomplished by fixing a sharp drop in the impulses as a result of drawing the counter away from the cathode. DEUTERIUM ACCELERATOR-DISCHARGER: An aluminum anode, a deuterium target, and heavy water are used. A flux of hydrogen nucleii is obtained to bombard the cathode. The neutrons obtained should be counted by a scintillation counter.

AD-631 303 See Fld. 20/8

AD-631 727 See Fld. 5/1

20/8. PARTICLE PHYSICS

AD-631 198 Fld. 20/8, 18/8, 18/2
CFSTI Prices: HC $1.00 MF $0.50
NAVAL RADIOLOGICAL DEFENSE LAB SAN FRANCISCO CALIF
BETA ENERGY EMISSION RATE FROM NEUTRON-IRRADIATED URANIUM-235-CARBIDE PARTICLES,
by James F. Pestaner, and Richard Yahiku. 11 Jan 66, 16p. Rept. no. USNRDL-TR-987, Contract (AT-49-2)-2505,
Unclassified report

Descriptors: (*Beta particles, Counting methods), (*Beta-ray spectrum, Counting methods), Uranium compounds, Carbides, Radioactive isotopes, Radiation measurement systems, Iron compounds, Sulfates, Fission, Dosimeters, Neutron activation, Emissivity

The beta energy emission rate from neutron-irradiated, uranium-235-carbide particles was measured by chemical dosimetry. The particles were suspended by vigorous stirring in ferrous sulfate solutions. The oxidation of ferrous to ferric ion was the chemical change measured, this change being related to the energy absorbed by the solution. Good agreement was obtained between the existing calculated and the experimental values of beta energy emission rate. From these data, simplified equations were derived for calculating beta energy emission rate as a function of particle size and time after fission, and they are presented. (Author)

AD-631 231 Fld. 20/8, 12/1
CFSTI Prices: HC $4.60 MF $0.50
CARNEGIE INST OF TECH PITTSBURGH PA DEPT OF PHYSICS
A STUDY OF THE HARTREE-FOCK APPROXIMATION AS APPLIED TO FINITE NUCLEI.
Technical rept.,
by K. T. R. Davies, S. J. Krieger, and M. Baranger. Mar 66, 50p. Rept. no. TR-23, Contract Nonr-760 (15), Proj. NR-024-439,
Unclassified report

Prepared in cooperation with Oak Ridge National Lab., Tenn.

Descriptors: (*Hartree-Fock approximation, *Nuclear properties), Potential theory, Nuclear energy levels, Wave functions, Nuclear shell models, Nuclei

Hartree-Fock calculations have been performed for the closed-shell nuclei 16O, 40Ca, and 80Zr, and, with certain simple approximations, for the open-shell nuclei 12C, 28Si, and 60Zn. The velocity dependent two-body force acts in relative s-states only. The force saturates nuclear matter at the correct energy and density and yields small second order perturbation corrections, but has too large a range to be in good agreement with the two-body data. However the choice of this simple force enables us to study the Hartree-Fock approximation in detail which is the main purpose of this paper. The authors calculate wave functions, energy levels, binding energies, and density distributions for the six nuclei and obtain rough agreement with the experimental results. A discussion is given of the non-local Hartree-Fock potential. (Author)

AD-631 303 Fld. 20/8, 20/7
CFSTI Prices: HC $1.00 MF $0.50
GIBBS LAB YALE UNIV NEW HAVEN CONN
ANNUAL SUMMARY REPORT, JANUARY 1, 1965 -MARCH 31, 1966,
by Vernon W. Hughes. 31 Mar 66, 10p. Contract Nonr-609 (53), Proj. NR-014-306,
Unclassified report

Descriptors: (*Electrons, Polarization), (*Particle beams, Potassium), Molecules, Electron transitions, Lithium, Helium, Nuclear magnetic moments, Spin, Sparks, High-pressure research, Vacuum, Electromagnetic pulses

ATOMIC BEAM SOURCE OF POLARIZED ELECTRONS: (1) Large depolarization effect in potassium beam experiments: Non-adiabatic transitions and collisions with gas molecules were proven not responsible for polarization observed after elimination of potassium molecules. The following effects were responsible: insufficient energy discrimination in the Mott scattering apparatus and the overlap by the strong line of the high-pressure mercury arc on the wavelength of the second resonance transition in potassium. (2) Higher intensity source of polarized electrons: a pulsed light source and a lithium atomic beam were selected for improving the source of polarized electrons. (3) A high-pressure-spark light source was built as a source of polarized electrons. MAGNETIC RESONANCE: Precision measurement was made of the ratio of the nuclear magnetic moment of He-3 to that of the proton (W. C. Williams and V. W. Hughes, Bull. Am. Phys. Soc., 11:121 (1966)).

AD-631 387 Fld. 20/8, 20/13
CFSTI Prices: HC $1.00 MF $0.50
DUKE UNIV DURHAM N C DEPT OF PHYSICS
SEMIANNUAL REPORT, OCTOBER 1, 1965-MARCH 31, 1966.
Status rept.,
by Horst Meyer. 31 Mar 66, 4p. Contract Nonr-1181 (12),
Unclassified report

See also AD-434 277, AD-601 933.

Descriptors: (*Nuclear magnetic resonance, *Hydrogen), (*Garnet, Specific heat), Deuterium, Solids, Rare earth compounds, Yttrium compounds, Iron, Radioactive isotopes, Relaxation time

NUCLEAR RESONANCE IN SOLID H2 and D2. Measurements on derivatives of the line shape and on longitudinal relaxation time were carried out on solid H2 for several ortho concentrations as a function of temperature. A new interpretation was made of the relaxation mechanism in solid H2: the interpretation was based on electric quadrupole-quadrupole interaction. SPECIFIC HEAT OF RARE EARTH GARNETS: Measurements between 0.4 and 4.0 degrees K on a superpure yttrium, iron, garnet (YIG) sample show that the specific heat cannot be analyzed at low enough temperatures in terms of a T (3/2) spin wave contribution (corrected for anisotropy and dipolar coupling) and the T (3) lattice contribution. NUCLEAR RESONANCE OF FE-57 IN RARE EARTH GARNETS: The 57-Fe gyromagnetic ratio in YIG was measured with a precision comparable to that obtained by Endor measurements. Spinwave expressions for magnetization in YIG in an external magnetic field were tested at 63 and 77 degrees K.

AD-631 461 Fld. 20/8
STANFORD UNIV CALIF
ELECTRON SCATTERING FROM NONSPHERICAL NUCLEI,
by B. W. Downs, D. G. Ravenhall, and D. R. Yennie. 5 Mar 57, 5p. Contract AF 18 (600)-545,
AFOSR TN-57-36
Unclassified report

Availability: Published in The Physical Review v106 n6 p1285-9 Jun 15 1957. Copies to DDC users only.

Descriptors: (*Electrons, *Nuclear scattering), (*Tantalum, Nuclear scattering), Hafnium, Tungsten, Uranium, Nuclear shell models, Nuclear cross sections, Deformation, Nuclear structure

To explain the anomalously smooth cross sections observed in electron scattering from certain nuclei (Hf,Ta,W,U), the contributions to the cross section arising from the nonspherical character of those nuclei were examined. Approximations are developed for the calculation of these contributions, and for a sample case, Ta, numerical results are given; the value required for the nuclear distrotion in order to obtain agreement with experiment in this case is in good agreement with the spectroscopic and Coulomb-excitation values. The results suggest that in certain cases electron scattering will be a useful new method for measuring both the magnitude and the radial shape of nuclear deformations. (Author)

AD-631 472 Fld. 20/8
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
ON A CLASSICAL DISTRIBUTION USED IN ELECTRON CAPTURE.
Physical sciences research papers,
by R. A. Mapleton. 16 Aug 65, 9p. Rept. no. afcrl-PSRP-205,AFCRL-66-186
Proj. AF-8627, Task 862706,
Unclassified report

Availability: Published in Proceedings of the Physical Society v87 p219-22 1966. Copies to DDC users only.

Descriptors: (*Electron capture, Statistical distributions), Quantum statistics, Momentum, Velocity, Electrostatic fields

A classical velocity distribution function used by Bates and Mapleton is derived and compared with the corresponding distribution of quantum mechanics. This classical distribution is related to other classical distributions for the attractive Coulomb field by an integral over the classical angular momentum. Among these other velocity distributions is the one recently given by Gryzinski. (Author)

AD-631 602 Fld. 20/8, 20/9
QUEEN'S UNIV BELFAST (NORTHERN IRELAND) SCHOOL OF PHYSICS AND APPLIED MATHEMATICS
CLASSICAL CALCULATIONS ON ELECTRON CAPTURE.
Revised ed.,
by D. R. Bates, and R. A. Mapleton. 8 Nov 65, 13p. Contract N62558-4297,
Unclassified report

Revision of manuscript submitted 17 Sep 65.

Availability: Published in Proceedings of the Physical Society v87 p657-68 1966. Copies to DDC users only.

Descriptors: (*Electron capture, Theory), Nuclei, Gases, Nuclear resonance, Vector analysis, Approximation (Mathematics), Plasma medium, Cesium, Great Britain

The classical theory of Thomas on electron capture from heavy atoms by fast nuclei is considered. A modification is introduced. It is found that the predictions of the modified theory are in quite good accord with the measurements of Barnett and his associates. The extent to which the scaled experimental data on a number of gases may be represented by a single curve is striking. Capture from light atoms is also discussed. The approximations made in the classical impulse approximation are here unsatisfactory. A simple classical theory of symmetrical resonance capture in slow encounters is developed. It is remarkably successful. (Author)

AD-631 261 **See Fld. 4/1**

AD-631 455 **See Fld. 18/11**

AD-631 481 **See Fld. 7/5**

AD-631 579 **See Fld. 20/10**

AD-631 704 **See Fld. 20/10**

AD-631 747 **See Fld. 18/8**

AD-631 801 **See Fld. 4/1**

20/9. PLASMA PHYSICS

AD-631 339 Fld. 20/9, 22/2, 20/4
CFSTI Prices: HC $3.60 MF $0.50
LINCOLN LAB MASS INST OF TECH LEXINGTON
TIME BEHAVIOR OF MULTIPLE SCATTERING,
by B. Rosen, and R. S. Ruffine. Dec 65, 34p. Contract AF 19 (628)-5167 ,ARPA Order-600
ESD TDR-66-44
Unclassified report

Prepared in cooperation with Radio Corp. of America, Moorestown, N. J., Missile and Surface Radar Div., Re-entry analysis technical monograph RATM-65-01.

Descriptors: (*Plasma medium, Backscattering), (*Reentry vehicles, Wake), (*Radar echo areas, Mathematical analysis), Cylindrical bodies, Time, Plasma physics, Atmosphere entry, Approximation (Mathematics), Wave functions, Magnetic fields

Cross-polarized electromagnetic backscatter from a cylinder of underdense plasma is considered when the input is a r-f pulse of finite duration. The second Born approximation is employed. The dimensions of the scatterer are assumed large compared with the r-f wavelength and the correlation distance. For times sufficiently long after the pulse has ended, the 'cross section' is shown to fall off as the reciprocal of the time squared. An estimate is made of the effect of a non-uniform electron density and it is found that, provided the rate of decay is not too great, the cross-polarized backscatter and the directly -polarized backscatter arise from the same volume of the scatterer. (Author)

AD-631 372 Fld. 20/9
CFSTI Prices: HC $5.00 MF $1.00
COLUMBIA UNIV NEW YORK PLASMA LAB
NORMAL IONIZING SHOCK WAVES.
by Robert T. Taussig. 1965. 184p. Rept. no. 23, Contract AF 49 (638)-1254.
Unclassified report

Descriptors: (*Shock waves, Mathematical analysis), (*Magnetohydrodynamics, Shock waves), Gas ionization, Electromagnetic fields, Dissociation, Hydrogen, Thermodynamics, Stability

Solutions to the steady state jump equations are obtained for a normal ionizing shock wave moving into a nonconducting, stationary gas in an electromagnetic field. The properties of ionizing shock waves common to pure MHD and to ordinary gas shocks are discussed. Coupling between electromagnetic and dissociation-ionization effects across the shock is analyzed. Numerical solutions are presented for several electric field strengths in molecular hydrogen using accurate thermodynamic properties and assuming that the gas upstream and downstream from the shock is in chemical equilibrium. The steady state problem of a current-driven shock wave is solved in the context of an electromagnetic annular shock tube. The results agree well with experimental evidence. Evolutionary normal ionizing shock wave solutions are selected and their stability determined in perfect fluid. A theory of shock wave stability in a fully dissipative fluid, based on recent work in magnetohydrodynamics, is outlined.

AD-631 379 Fld. 20/9, 20/4
COLUMBIA UNIV NEW YORK
STRONG IONIZING SHOCK WAVES.
by Robert A. Gross. 1965. 21p. Contract AF-49 (638)-1254, AFOSR 66-0356
Unclassified report

Availability: Published in Reviews of Modern Physics v37 n4 p724-43 Oct 1965. Copies to DDC users only.

Descriptors: (*Shock waves, *Magnetohydrodynamics), Gas ionization, Dissociation, Shock tubes, Thermonuclear reactions, Stability, Transport properties, Plasma oscillations, Electric fields, Thermal radiation, Photons, Plasma medium, Relativity theory

The physical effects created by strong shock waves propagating in hydrogen are reviewed and theoretically studied for speeds up to relativistic conditions. In the progression from weak to relativistic shock speeds, various physical phenomena affect the shock wave. Dissociation, ionization, and the presence of an upstream electric field cause several important effects for slow (sub-Alfvenic speed) normal ionizing shock waves. Switch-on shock behavior is extended to slow ionizing waves. The effect of radiation is investigated for both the optically thick and thin cases. Relativistic shock jump equations are solved for wave speeds approaching the speed of light. Thermonuclear shock solutions are examined. The theory of the electromagnetically driven shock tube is reviewed and the corresponding shock tube problem is explored. Wave stability is reviewed. Experimental results on strong ionizing shock waves are reviewed and discussed. (Author)

AD-631 469 Fld. 20/9, 20/13
CFSTI Prices: HC $3.00 MF $0.75
LITTLE (ARTHUR D) INC CAMBRIDGE MASS
CHARACTERISTICS OF METAL VAPOR.
Final scientific rept., 15 May 63-3 Oct 65, by Alfred E. Wechsler. Jan 66. 82p. Rept. no. 65636-2, Contract AF 33 (657)-11735, Proj. AF-7063, ARL 66-0004
Unclassified report

See also AD-409 582 and -616 110.

Descriptors: (*Metals, Vapors), (*Plasma physics, Absorption spectrum), (*Electric arcs, Radiation (Heat transfer)), Alkali metals, Sodium, Potassium, Cesium, High-temperature research, Band spectrum, Molecular properties, Atomic properties, Line spectrum, Optical equipment

The objectives were to examine the radiation attenuation properties of alkali metal vapors and their effects on the radiation heat transfer characteristics of arc and plasma systems. An absorption cell used to measure the transmittance of sodium, potassium and cesium vapor over the temperature range from 300 to 900K with alkali partial pressures of 0.001 to 40 torr is described. A grating spectrometer was used with the cell to obtain data over the wave length region from 0.2 to 1.0 micron. Strong widespread absorption in the visible and near infrared regions caused by band absorption of the alkali metal molecules and absorption in narrow regions surrounding the first principal series lines of the alkali metal atoms were noted. Molecular absorption cross section values, calculated from plots of transmittance versus the effective vapor path length in the absorption cell, varied from 0.1 to 30 sq Angstrom units, depending upon the alkali metal type and the wave length. The molecular cross sections for cesium were larger than for potassium; sodium had the smallest cross section. Effective atomic absorption cross sections were calculated in the regions where atomic absorption was dominant. Sample calculations based upon the measured cross sections indicated that up to 30% of the radiation emitted by a source at 10,000K could be absorbed in a 2.5 - cm layer of alkali metal vapor (cesium) in equilibrium at 400C. (Author)

AD-631 471 Fld. 20/9
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
HYDROMAGNETIC EIGENMODES IN MULTIPOLE FIELDS.
Physical sciences research papers, (reviseded.), by R. L. Carovillano, and J. F. McClay. 17 Aug 65. 12p. Rept. no. AFCRL-PSRP-204,AFCRL-66-173
Proj. AF-7601, Task 760101,
Unclassified report

Revision of manuscript submitted 29 Mar 65. Prepared in cooperation with Boston Coll., Chestnut Hill, Mass., Dept. of Physics.

Availability: Published in The Physics of Fluids v8 n11 p2006-13 Nov 1965. Copies to DDC users only.

Descriptors: (*Magnetohydrodynamics, Mathematical analysis), (*Plasma oscillations, Propagation), Magnetic fields, Harmonic analysis, Vector analysis, Electric fields, Wave functions, Perturbation theory

A formalism is developed providing an exact analytical procedure for determining linearized hydromagnetic wave phenomena in a perfectly conducting plasma permeated by a static magnetic multipole field. All perturbations are harmonically represented by scalar and vector spherical harmonics. The vector wave equation for the perturbed electric field is then reduced to a set of coupled equations in the radial variable alone. Different harmonic modes are coupled because the vector wave equation is not simply separable in spherical coordinates (or any other known system of coordinates). The physical significance of operative couplings derives from parity and angular momentum conservation requirements. It is shown that the radial equations are generally soluble in principle. (Author)

AD-631 504 Fld. 20/9
CFSTI Prices: HC $4.60 MF $0.50
ARNOLD ENGINEERING DEVELOPMENT CENTER ARNOLD AIR FORCE STATION TENN
RELAXATION TO THE STEADY STATE IN A CONDUCTING NONEQUILIBRIUM PLASMA STREAM,
by Bill P. Curry. Apr 66. 42p. Rept. no. AEDC-TR-66-43,
Contract AF 40 (600)-1200, Proj. PT3000,
Unclassified report

Prepared in cooperation with ARO, Inc., Tullahoma, Tenn.

Descriptors: (*Plasma oscillations, *Relaxation time), Argon, Nitrogen, Potassium, Nonequilibrium flow, Electric fields, Energy, Temperature, Molecular energy levels, Electrical conductance, Momentum, Plasma medium

The relaxation of a seeded plasma subjected to a constant electric field is considered within the formalism of the two-temperature theory. Numerical solutions are obtained for streamwise conductivity profiles in both argon and nitrogen plasmas seeded with potassium. Reaction rates used here are analytical formulae based on the Byron model for collision-induced recombination. Extensive analysis of the computed results and comparison with Zukoski's experiments in argon establish the validity of the basic treatment and suggest the existence of energy losses resulting from excitation of argon transitions originating at the first excited state, in addition to the usual elastic collision and potassium excitation energy losses. Details of the Byron model are validated by comparison of theoretical and experimental time-resolved potassium emission lines. Possible nonequilibrium effects in nitrogen are investigated with various assumed molecular excitation losses. Relaxation times for both types of plasmas are correlated by use of Zukoski's characteristic time parameter. (Author)

AD-631 517 Fld. 20/9, 14/2, 20/5
CFSTI Prices: HC $2.00 MF $0.50
BALLISTIC RESEARCH LABS ABERDEEN PROVING GROUND MD
USE OF A LANGMUIR PROBE FOR ELECTRON TEMPERATURE DETERMINATION IN A LASER-INDUCED PLASMA.
Memorandum rept.,
by William F. Braerman. Dec 65. 49p. Rept. no. BRL-MR 1715,
Proj. RDT-E-1P014501A31C
Unclassified report

Descriptors: (*Langmuir probes, *Plasma physics), (*Electrons, Temperature), (*Lasers, Plasma physics), Determination, Electron density

The possibility of using Langmuir probes for electron temperature determination in a laser-induced plasma has been demonstrated. Laser input energies less than 15 joules have been used and electron temperatures on the order of 0.5 ev have been inferred at various distances from the target. The beam was focused to approximately a 1 mm diameter spot. It is shown that the probe current at the start of the pulse follows the laser spiking. (Author)

AD-631 547 Fld. 20/9, 20/4
CORNELL UNIV ITHACA N Y
ON THE STABILITY OF FORWARD AND REARWARD SLUG FLOWS DUE TO THE MOTION OF BODY THROUGH A PERFECTLY CONDUCTING LIQUID,
by S. Leibovich, M. Lessen, and H. M. Zien. 12 Jun 65. 3p. Contract DA-31-124-ARO (D)-325, AROD 5329:4
Unclassified report

Prepared in cooperation with Rochester Univ., N. Y.

Availability: Published in Journal of Fluid Mechanics v24 pt2 p335-7 1966. Copies to DDC users only.

Descriptors: (*Magnetohydrodynamics, Stability), Equations of motion, Two-dimensional flow

The stability of forward and rearward slug flows due to the motion of a body through a perfectly conducting liquid with an embedded magnetic field aligned to the direction of motion is studied. It is found that, for sub-Alfvenic flows, the forward and rearward slug flows predicted by Stewartson, Leibovich and Ludford are stable. For super-Alfvenic flows, if at all meaningful, both the forward and the rearward slug flows are stable also. (Author)

AD-631 569 Fld. 20/9, 20/3, 20/4
CFSTI Prices: HC $2.60 MF $0.50
TECHNISCHE HOCHSCHULE AACHEN (WEST GERMANY)
INTERACTIONS OF AN ELECTRIC ARC PLASMA WITH TRANSVERSAL MAGNETIC FIELDS AND GAS FLOWS.
Scientific summary rept. 1 Jun 64-30 Nov 65, by E. Fischer, W. Fucks, and J. Uhlenbusch. 30 Nov 65, 28p. Contract AF 61 (052)-805, ARL 66-0077

Unclassified report

Descriptors: (*Plasma medium, Mathematical analysis), (*Magnetic fields, Plasma physics), (*Gas flow, Plasma medium), Electric arcs, Partial differential equations, West Germany

Calculation is made of the temperature distribution and the flow field in a wall stabilized arc, which is burning in a constant magnetic field perpendicular to the arc axis. The interactions of an arc plasma with an external gas flow are treated for the column of a free burning arc exposed to a homogenecus flow of cold or preheated gas perpendicular to the arc axis, that is to the line between the electrodes. The arc fluctuate, the flow field and the temperature distribution are calculated.

AD-631 591 Fld. 20/9, 21/3, 20/13
CFSTI Prices: HC $2.60 MF $0.50
ARNOLD ENGINEERING DEVELOPMENT CENTER ARNOLD AIR FORCE STATION TENN
STUDY OF THE ENERGY ADDITION PROCESS IN A D-C ARC-JET.
by R. J. Bryson, and J. P. Frohlich. Apr 66, 25p. Rept. no. AEDC-TR-65-268, Contract AF 40 (600)-1200, Proj. AF-8951, ARO-RW3501

Unclassified report

Prepared in cooperation with ARO, Inc., Arnold Air Force Station, Tullahoma, Tenn.

Descriptors: (*Plasma jets, Thermodynamics), (*Arc-jet engines, Thermodynamics), Plasma generators, Excitation, Gas ionization, Argon, Electrical properties, Power

The thrust produced by a d-c arc-jet plasma generator operating with argon was measured and used to determine the division of the energy added to the gas between that which produced excitation and ionization and that which served to increase the translational energy of the gas. Energy division predicted by the Rayleigh heat addition theory was compared with the experimental determination and was found to be in fair agreement (15 to 30 percent). The plasma generator was operated at electrical power inputs ranging from 1.9 to 3.8 kw. Energy losses to the electrodes amounted to about 30 percent, so that about 70 percent of the total electrical energy input was actually added to the gas. The amounts of energy added to the gas ranged from 220 to 440 Btu/lb-m at an argon flow rate of 0.00527 lb-m/sec. On the average, only about 40 percent of this energy addition was utilized to increase the total translational energy of the gas, and the remainder served to produce electronic excitation and ionization. (Author)

AD-631 597 Fld. 20/9
MITRE CORP BEDFORD MASS
FLAME PLASMA SEEDED WITH SULFUR HEXAFLUORIDE,
by Jerome Hoffman, and Edgar A. Westbrook. 23 Apr 65, 6p. Contract AF 19 (628)-2390, Proj. AF-705.1, ESD TR-65-102

Unclassified report

Availability: Published in The Physics of Fluids v8 n7 July 1965. Copies to DDC users only.

Descriptors: (*Plasma medium, Additives), (*Sulfur compounds, Fluorides), Electrons, Density, Probes (Electromagnetic), Microwaves, Flames

The use of electronegative gases such as sulfur hexafluoride to reduce the electron concentration in a flame plasma has been investigated by microwave probe techniques. Sulfur hexafluoride was found to have only a small effect, under the conditions of the experiment, as compared to the large effect on a discharge plasma reported in the literature. (Author)

AD-631 651 Fld. 20/9
CFSTI Prices: HC $3.00 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
PLASMA DYNAMICS REPORT.
1963, 56p. Rept. no. TG-540, Contract NOw-62-0604-c,

Unclassified report

Four papers presented at the Meeting of the American Physical Society Division of Plasma Physics, Nov 6-9, 1963.

Descriptors: (*Plasma oscillations, Space charges), (*Electron beams, Plasma physics), (*Magnetic fields, Plasma physics), (*Magnetic pinch, Measurement), Ion Beams, Hydrogen, Numerical Analysis, Geometry, Magnetic moments, Electrons, Scattering, Argon, Helium, Deuterium

Contents: Observations of growing waves in a beam -plasma interaction, by John R. Apel and Albert M. Stone; Beam-plasma modes in cylindrical geometry, by Ernest P. Gray; Experimental determination of the adiabatic region in a cusped geometry, by Claude S. Leffel; Implosion measurements in a small fast theta pinch, by Robert Turner.

AD-631 672 Fld. 20/9
CFSTI Prices: HC $4.00 MF $0.75
NORTHROP SPACE LABS HAWTHORNE CALIF
INVESTIGATION OF THE INTERACTION OF AN EXTERNAL MAGNETIC FIELD WITH AN ELECTRIC ARC.
Final rept. Dec 64-Dec 65, by Harry N. Olsen, C. D. Maldonado, G. D. Duckworth, and A. P. Caron. Jan 66, 113p. Rept. no. NSL-65-204, Contract AF 33 (615)-1105, Proj. AF-7063, Task 706303, ARL 66-0016

Unclassified report

Descriptors: (*Electric arcs, *Magnetic fields), (*Plasma medium, Magnetic fields), Emissivity, Mathematical models, Programming (Computers), Argon, Line spectrum, Atomospheric entry, Simulation, Thermodynamics, Integral equations, Series

A unique method was formulated mathematically for inverting the integral equation relating the integrated spectral intensity to the internal emission coefficient for any general geometry of an optically thin plasma. The method, specialized to the case of one mirror plane of symmetry, was programed for the IBM 7090 and properly tested by means of assumed analytical models. To demonstrate the practical nature of the inversion method as a research tool it was used to measure, for the first time, the absolute emission coefficient of the 6965 wavelength atomic spectral line emitted by the 400 ampere argon arc when distorted by a 36 Gauss external magnetic field. The computer program and test sample are included in the report. (Author)

AD-631 336 **See Fld. 20/11**

AD-631 426 **See Fld. 9/1**

AD-631 434 **See Fld. 7/4**

AD-631 485 **See Fld. 7/4**

AD-631 488 **See Fld. 9/5**

AD-631 602 **See Fld. 20/8**

AD-631 694 **See Fld. 20/14**

AD-631 711 **See Fld. 20/12**

AD-631 712 **See Fld. 5/1**

AD-631 743 **See Fld. 20/3**

20/10. QUANTUM THEORY

AD-631 243 Fld. 20/10, 12/1
CFSTI Prices: HC $17.70 MF $1.00
TEXAS UNIV AUSTIN
FINITE GROUP ALGEBRAS AND QUANTUM MECHANICS.
Technical rept. on Molecular Physics Group, by F. A. Matsen. Oct 62, 181p. Contract AF-AFOSR-62-270, AFOSR 5522

Unclassified report

Descriptors: (*Algebras, *Quantum mechanics), Theorems, Functions, Permutations, Fermions, N-body problem, Physical chemistry

Contents: Preface; Groups and group algebras; Eigen -projector theorem; Coset subalgebras; Permutation algebra; N-fermion system; Spin-free quantum chemistry; and Supermultiplet theory.

AD-631 255 Fld. 20/10, 12/1
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF PURE PHYSICS
NUMERICAL SOLUTIONS OF THE Q-EQUATION,
by A. M. Guenault. 24 Jun 65, 3p. NRC 8646

Unclassified report

Availability: Published in Physica v31 p1418-20 1965. Copies to DDC users only.

Descriptors: (*Numerical methods and procedures, *Partial differential equations), Simultaneous equations, Scattering, Relaxation time, Canada

AD-631 275 Fld. 20/10
CFSTI Prices: HC $2.60 MF $0.50
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
SOURCE-FIELD CAUSALITY AND ITS APPLICATION TO CLASSICAL RADIATION THEORY.
Physical and mathematical sciences research papers, by E. J. Post. Feb 66, 29p. Rept. no. AFCRL-66-146, AFCRL-PMSRP-201 Proj. AF-5635, Task 563501,

Unclassified report

Descriptors: (*Electromagnetic waves, Theory), (*Field theory, Differential equations),

Potential theory, Quantum mechanics, Operators (Mathematics), Wave functions

A mathematical procedure is given for singling out the causal solutions from the general set of solutions of self-adjoint differential equations. It consists in splitting the self-adjoint equation into a pair of adjoint equations whose solutions are purely causal and purely anti-causal, respectively. A subsequent merging of the equations then generates in full detail, including singularities, the causal and anti-causal solutions of the original self -adjoint equation. As an important example, it is shown that the d'Alembertian with point source has a legitimate causal solution involving both retarded and advanced potentials at the source point itself, while at all other points, the retarded potential alone satisfies causality. Within the context of the formalism some recent attempts at modifying classical radiation theory can now be reassessed and more clearly categorized. In particular, the Dirac and Wheeler-Feynman approaches are examined in this light. (Author)

AD-631 292 Fld. 20/10, 12/1
CFSTI Prices: HC $5.60 MF $0.75
UPPSALA UNIV (SWEDEN) QUANTUM CHEMISTRY GROUP
BIPOLAR EXPANSION OF SCREENED COULOMB POTENTIALS, HELMHOLTZ' SOLID HARMONICS, AND THEIR ADDITION THEOREMS.
Scientific rept.,
by Reikichi Nozawa. 1 Nov 65, 58p. Rept. no. Scientific-53,
Contract AF 61 (052)-701,
ARL 66-0076

Unclassified report

Descriptors: (*Field theory, Harmonic analysis), (*Harmonic analysis, Quantum mechanics), (*Bessel functions, Quantum mechanics), Wave functions, Operators (Mathematics), Potential theory, Integrals, Special functions, Sweden

Helmholtz' solid harmonics (spherical Bessel functions X spherical surface harmonics) are generated from fundamental spherical waves through a ladder procedure using raising and lowering operators. The addition theorem for them and the bipolar expansion formula of a screened Coulomb potential are derived. A method for evaluating two-center integrals with a general potential is given which is new and useful in practical calculations. Lastly, a key function, which appears in all the essential results, is studied in detail. (Author)

AD-631 375 Fld. 20/10, 3/2
SOUTHWEST CENTER FOR ADVANCED STUDIES DALLAS TEX
NEW HOMOGENEOUS SOLUTIONS OF EINSTEIN'S FIELD EQUATIONS WITH INCOHERENT MATTER,
by Istvan Ozsvath. Jan 65, 37p. Contract AF AFOSR-903-65,NsG-269-62 Proj. AF-9751, Task 975103,
AFOSR 66-0479

Unclassified report

Availability: Published in Abhandlungen der Mathematisch-Naturwissenschaftlichen Klasse nl p3-31 Jan 1965. Copies to DDC users only.

Descriptors: (*Field theory, *Equations), Algebra, Relativity theory, Astrophysics

AD-631 579 Fld. 20/10, 20/8, 20/6
CFSTI Prices: HC $1.60 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
SELECTION RULES FOR NONADIABATIC TRANSITIONS,
by N. N. Kristofel. 23 Mar 66, 12p. Rept. no. FTD-TT-65-1490,
TT 66-61101

Unclassified report

Unedited rough draft trans. of Akademiya Nauk Estonskoi SSR, Tallin. Institut Fiziki i Astronomii. Trudy, v21 p12-9 1962.

Descriptors: (*Nuclei, Oscillation), (*Electron transitions, *Selection rules), Wave functions, Nuclear energy levels, Harmonic analysis, Luminescence, Potential theory, Spectroscopy, USSR

The problem of the symmetry of nuclear oscillations which permit nonadiabatic transition between definite electronic states is discussed.

AD-631 704 Fld. 20/10, 20/8
CFSTI Prices: HC $2.00 MF $0.50
SYRACUSE UNIV N Y DEPT OF PHYSICS
AN EXPERIMENTALIST'S VIEW OF SU3,
by Jack Leitner. 1966, 37p. Contract Nonr-669 (12), Proj. NR-022-296,
ONR 66-1

Unclassified report

Review talk presented at Michigan Univ. and Michigan State Univ. on 7 Feb 66.

Descriptors: (*Quantum mechanics, Reviews), (*Elementary particles, Classification), Field theory, Nuclear reactions, Mathematical models

AD-631 290 See Fld. 7/4

AD-631 291 See Fld. 7/4

AD-631 430 See Fld. 7/4

AD-631 601 See Fld. 3/2

AD-631 622 See Fld. 14/5

AD-631 676 See Fld. 20/6

20/11. SOLID MECHANICS

AD-631 233 Fld. 20/11, 14/2
CFSTI Prices: HC $6.00 MF $1.25
NAVAL RESEARCH LAB WASHINGTON DC SHOCK AND VIBRATION INFORMATION CENTER
THE SHOCK AND VIBRATION BULLETIN.
Feb 66, 243p. Rept. no. Bulletin-35-Pt-4,

Unclassified report

Presented at Symposium on Shock, Vibration and Associated Environments (35th), New Orleans, La. 25-28 October 1965. See also AD-628 600.

Descriptors: (*Shock (Mechanics), Symposia), (*Vibration, Symposia), Instrumentation, Accelerometers, Transducers, Spectrum analyzers, Structures, Mathematical analysis, Dynamics

Contents: Integration and double integration-a practical technique; The measurement of internal dynamics of equipment; Piezoresistive strain gage accelerometers increase spectrum of shock and vibration measurement capability; Vibration measurements using a microwave interferometer; A wideband absolute accelerometer calibrator utilizing a laser for measuring vibratory dilacements; Unpublished accelerometer characteristics; New precision calibration techniques for vibration transducers; Omnidirectional acceleration sensor; Effective use of accelerometers as calibration standards; Measurement of accelerometer transverse sensitivity; First occurrence probabilities for extreme random vibration amplitudes; Signal detection using impulse crosscorrelation; A means to reduce random vibration analysis time; A continuous frequency constant q shock spectrum analyzer; Slope error of power spectral density measurements; The effects of phase errors upon the measurement of random processes; Utilization of a digital computer for on-line acquisition and analysis of acoustic and vibration data; A digital data recording system for structural dynamics response testing; Comparison of analog and digital methods for vibration analysis; Automatic real-time vibration spectrum analyzer system using delay line time compression techniques; The analog cross spectral density analyzer system; Transient data distortion compensation.

AD-631 234 Fld. 20/11, 13/6, 19/3, 22/1
CFSTI Prices: HC $7.00 MF $1.75
NAVAL RESEARCH LAB WASHINGTON D C SHOCK AND VIBRATION INFORMATION CENTER
THE SHOCK AND VIBRATION BULLETIN.
Feb 66, 329p. Rept. no. Bulletin-35-Pt 5,

Unclassified report

Presented at Symposium on Shock, Vibration and Associated Environments (35th), New Orleans, La. 25-28 Oct. 1965. See also AD-631 233.

Descriptors: (*Shock (Mechanics), Symposia), (*Vibration, Symposia), Transportation, Vibration isolators, Air transportation, Armed forces transportation, Railroads, Shipping (Marine), Damping, Space flight

Contents: A survey of shock and vibration environments in the four major modes of transportation; The dynamic environment of spacecraft surface transportation; A realistic derivation of a laboratory vibration test to simulate the overland transportation environment; A method for estimating accelerations of shipping containers mounted on an impacting railroad car; Preliminary analysis of data obtained in the joint army/aec/sandia test of truck transport environment; Roughness measurement and system response evaluation for highway environment; Program 624A-Titan III-C transportation tests; Dynamic environment of M-113 armored personnel carrier; Interpretation and application of specification requirements that simulate vibration responses of equipment being shipped by common carrier; Near-optimum shock mounts for protecting equipment from acceleration pulses; Shock attenuation using passive elements; Investigation of the vibration damping properties of viscoelastic material using a delay angle technique; Energy absorption by dynamic crushing; Dry friction damping with force proportional to displacement; Response of resilient mounts under shock loading; A new approach to package cushioning design; Optimal shock isolation synthesis; Vibration isolation through pneumatic spring and damping

AD-631 258 Fld. 20/11, 12/1
CFSTI Prices: HC $1.10 MF $0.50
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO
GENERALIZATION OF THE UNIT DISPLACEMENT THEOREM,
by J. S. Przemieniecki. 1966, 7p.

Unclassified report

Descriptors: (*Theorems, *Mechanics), Statics, Dynamics, Structures, Deformation, Moment of inertia, Equations of motion

The Unit Displacement Theorem is generalized to include inertia, thermal and distributed loading on continuous and discrete element structures. The theorem can then be applied to determine not only structural stiffnesses but also thermal and inertia properties of structures and equivalent concentrated forces due to a distributed loading. Exact expressions are derived for the calculation of frequency dependent stiffness and equivalent mass matrices used in structural vibrations analysis. To facilitate practical calculations these exact expressions are expanded into a matrix series in ascending powers of the frequency. This in turn leads to the formulation of the modified equation of motion and modified characteristic equation in which higher order terms are present. The first two terms in the matrix series for the stiffness and equivalent mass matrices are derived for a uniform bar element. In addition, the first term for the equivalent mass matrix is derived for the following structural elements: torsion bars, beams, triangular and rec-

tangular plates, solid tetrahedra and solid parallelepipeds. The use of the equivalent mass matrices in structural dynamics is recommended in preference to the conventional lumped masses. Further studies are required to determine whether the additional complications associated with the use of the modified characteristic equation are justified in practice. (Author)

AD-631 301 Fld. 20/11, 14/2
CFSTI Prices: HC $1.00 MF $0.50
ARMY MATERIALS RESEARCH AGENCY WATERTOWN MASS MATERIALS ENGINEERING DIV
MEASUREMENTS OF DISPLACEMENTS OF SPHERICAL CAPS DURING SNAP-THROUGH BUCKLING.
Technical rept.,
by Jiro Adachi. Jan 66, 15p. Proj. DA-1L013001A91A
AMRA TR-66-03

Unclassified report

Descriptors: (*Buckling (Mechanics), Structural shells), (*Structural shells, Deformation), Measurement, Surfaces, Geometric forms, Velocity, Acceleration, Transducers, Photoelectric cells (Semiconductor), Spheres, Dynamics, Polyvinyl chloride

Measurements were made of the dynamic buckling displacements of the surfaces of spherical caps during buckling under uniform external pressure. The report presents initial single-point measurements showing relationships between shell geometry and the magnitude of the surface displacements, velocities, and accelerations during buckling. The report also describes the use of the displacement transducer whose sensing element is a photovoltaic cell. (Author)

AD-631 336 Fld. 20/11, 20/9
CFSTI Prices: MF $1.00
INSTITUTE OF THE AEROSPACE SCIENCES INC NEW YORK
PROCEEDINGS OF AN AEROSPACE SCIENTIFIC SYMPOSIUM OF DISTINGUISHED LECTURERS.
11 May 61, 135p. Contract AF-AFOSR-61-47, AFOSR 4072

Unclassified report

Availability: Available from Institute of the Aerospace Sciences, Inc., New York, 2 East 64th St., $5.00.

Descriptors: (*Structural shells, Buckling (Mechanics)), (*Magnetohydrodynamics, Vortices), (*Scientific personnel, Scientific research), Symposia, Scientific organizations

Contents: Buckling of thin shells, by Nicholas J. Hoff; on the Karman vortex street in magnetofluid-dynamics, by Adolf Busemann; International cooperation in science, by Joseph Kaplan; Toward new horizons - 1961, by Joseph V. Charyk.

AD-631 363 Fld. 20/11, 12/1
CFSTI Prices: HC $3.00 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
FREQUENCIES OF BEAMS ON PARTIAL ELASTIC FOUNDATIONS.
Technical memo.,
by N. Rubinstein. Mar 66, 52p. Rept. no. TG-804,
Contract NOw-62-0604-c,

Unclassified report

Descriptors: (*Beams (Structural), Vibration), (*Elasticity, Mathematical analysis), Numerical methods + procedures, Errors, Matrix algebra, Statistical mechanics

Numerical procedures in obtaining upper and lower bounds to eigenvalues of various beam problems are presented. Various numerical problems and their cure when applying the bounding procedures are discussed. Upper bounds are obtained using the well-known Rayleigh-Ritz procedure and lower bounds are obtained using methods developed by Bazley and Fox (AD-608 356; 'Lower bounds to eigenvalues using operator decompositions of the form B*B'. Archive for Rational Mechanics and Analysis, 10:352-60 (1962)). Computational examples are given and tables of upper and lower bounds are displayed. (Author)

AD-631 389 Fld. 20/11
POLYTECHNIC INST OF BROOKLYN N Y DEPT OF MECHANICAL ENGINEERING
ON THE FORM OF VARIATIONALLY DERIVED SHELL EQUATIONS,
by Yi-Yuan Yu. 1964, 4p. Contract AF 49 (638)-1290,
AFOSR 66-0571

Unclassified report

Availability: Published in Journal of Applied Mechanics Jun 1965. Copies to DDC users only.

Descriptors: (*Calculus of variations, Elasticity), (*Elasticity, *Structural shells), Integral equations

AD-631 392 Fld. 20/11
TECHNISCHE HOCHSCHULE VIENNA (AUSTRIA)
DIE 'DURCHSCHLAGSZEIT' EINER VISKOELASTISCHEN FLACHEN KUGELSCHALE (ON THE 'SNAPPING-TIME' OF A VISCOELASTIC SHALLOW CIRCULAR SHELL),
by H. Parkus. 6 Feb 63, 6p. Contract AF 61 (052)-645,
AFOSR 66-0202

Unclassified report

Text in German.

Availability: Published in Osterreichisches IngenieurArchiv v17 n3 p167-9 1963. Copies to DDC users only.

Descriptors: (*Structural shells, Mechanical properties), Viscoelasticity, Mathematical analysis, Austria

AD-631 419 Fld. 20/11
CFSTI Prices: HC $1.00 MF $0.50
BROWN UNIV PROVIDENCE R I DIV OF APPLIED MATHEMATICS
ACCELERATION WAVES IN NONLINEAR MATERIALS.
Technical rept.,
by Bernard D. Coleman, and Morton E. Gurtin. Dec 65, 22p. Rept. no. TR-4,
Contract Nonr-562 (40), Proj. NR-064-4061,

Unclassified report

See also AD-626 294.

Descriptors: (*Viscoelasticity, Materials), (*Mechanical waves, Propagation), Elasticity, Acceleration, Mathematical analysis, Functions, Shock waves, Linear systems, Nonlinear systems, Continuum mechanics

The paper presents a unified discussion of certain recent results concerning the propagation of one-dimensional acceleration waves in nonlinear elastic materials, linearly viscoelastic materials, and general nonlinear materials with instantaneous elasticity and fading memory. (Author)

AD-631 508 Fld. 20/11
CFSTI Prices: HC $9.60 MF $0.75
STANFORD UNIV CALIF DEPT OF AERONAUTICS AND ASTRONAUTICS
THE PERPLEXING BEHAVIOR OF THIN CIRCULAR CYLINDRICAL SHELLS IN AXIAL COMPRESSION.
Technical rept.,
by Nicholas J. Hoff. Feb 66, 92p. Rept. no. SUDAAR-256,
Contract AF 49 (638)-1276, Proj. AF-9782, Task 978201,
AFOSR 66-0155

Unclassified report

Descriptors: (*Structural shells, Cylindrical bodies), (*Compressive properties, Structural shells), Buckling (Mechanics), Stability, Reviews

The development of our knowledge of the buckling of thin-walled circular cylindrical shells subjected to axial compression is outlined from the beginning of the century until the present, with particular emphasis on advances made in the last twenty-five years. It is shown that practical shells generally buckle under stresses much smaller than the classical critical value derived by Lorenz, Timoshenko, Southwell and Flugge. A first explanation of the reasons for the discrepancy was given by Donnell and the problem was explored in detail by von Karman, Tsien and their collaborators. More recently, Yoshimura discovered the existence of an inextensional displacement pattern which the wall of the shell can suddenly assume, and Koiter found an explanation of the sensitivity of the buckling stress to small initial deviations from the exact circular cylindrical shape. In the last few years further interesting discoveries were made in Japan and in California regarding the effects of details of the boundary conditions, and many additional numerical results were obtained with the aid of high-speed electronic digital computers. Improvements in experimental techniques have also contributed significantly to a clarification of the problem and to an establishment of the unavoidable deviations from the exact shape as the major causes of the large differences between theory and experiment. (Author)

AD-631 627 Fld. 20/11, 13/5
CFSTI Prices: HC $3.00 MF $0.75
LOUVAIN UNIV (BELGIUM) INSTITUT DE MECANIQUE APPLIQUEE
ON SINGULAR CONFIGURATIONS OF LINKAGES. KINEMATICS OF STRUCTURES.
Final technical rept. 1 Apr 62-31 Mar 64,
by F. Buckens. 31 Mar 64, 74p. Contract AF-EOAR-62-107,
AFOSR 64-1446

Unclassified report

Descriptors: (*Rods, Configuration), (*Structures, Mechanics), Stresses, Screws, Motion, Belgium, Force (Mechanics), Creep

AD-631 648 Fld. 20/11, 13/13
CFSTI Prices: HC $13.60 MF $1.00
DEFENSE RESEARCH LAB UNIV OF TEXAS AUSTIN
STUDIES ON LONGITUDINAL AND BENDING WAVES IN LONG ELASTIC RODS,
by H. J. Plass,Jr., and C. C. Steyer. 24 Apr 56, 136p. Rept. no. DRL-376,CM-860
Contract NOrd-16498, Task UTX-1,

Unclassified report

Descriptors: (*Rods, *Mechanical waves), Stresses, Propagation, Elasticity, Theory

The simplest approximate traveling wave theory is that which describes the longitudinal waves in a long rod resulting from an axial distrubance applied to the end of the rod. The present report covers primarily the theoretical phase of the project, although some experimental results are included for comparison purposes.

AD-631 654 Fld. 20/11, 12/1, 13/13
CFSTI Prices: HC $7.00 MF $1.75
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
ENGINEERING METHOD OF CALCULATION OF ELASTIC SYSTEMS FOR FREE VIBRATIONS,
by E. A. Sekhniashvili. 18 Jan 66, 356p. Rept. no. FTD-MT-64-377,
TT 66-61114

Unclassified report

Edited machine trans. of mono. Inzhenernyi Metod Rascheta Uprugikh Sistem na Svobodnye Kolebaniya, Tbilisi, 1960 346p.

Descriptors: (*Vibration, Determination), (*Elasticity, Vibration), Dynamics, Structures, Engineering, Numerical methods and procedures, USSR

CONTENTS: Free vibrations of systems with a finite number of degrees of freedom; Free vibrations of systems with an infinitely large number of degrees of freedom; Approximate methods of determining frequencies of free vibrations of material systems; Certain concepts from the calculus of variations; Application of Galerkin method to problems of free vibrations of material systems; Construction of the family of approximating (minimizing) functions during solution of problems of free vibrations of material systems; Determining the fundamental frequency of vibration of material bars; Determining higher frequencies of free vibrations of material bars; Determining frequencies of free vibrations of material systems by an expanded conjugate beam method; Determining frequencies of free vibrations of bar trusses; Influence of shearing strain and inertia of rotation of section on magnitude of frequency of free vibrations; and Determining modes of free vibrations of material bar in the general case.

AD-631 766 Fld. 20/11
CFSTI Prices: HC $1.00 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
SOLUTION OF THE PROBLEMS OF FREE FLUCTUATIONS OF ANISOTROPIC DISCS,
by L. A. Movsisyan, and V. S. Sarkisyan. 15 Mar 66, 12p. Rept. no. FTD-TT-65-890, TT 66-61123

Unclassified report

Unedited rough draft trans. of Akademiya Nauk Armyanskoi SSR, Erevan. Izvestiya. Seriya Fiziko-Matematicheskikh Nauk, v17 n4 p43-50 1964.

Descriptors: (*Disks, Anisotropy), (*Elasticity, Theory), Mathematical analysis, USSR

In this work, a method of determining the natural frequency of free fluctuations of anisotropic discs is suggested which allows us to determine the natural frequencies in advance with any given precision in the limits of the classic theory of bending of discs. As a particular example, the problem of free fluctuations of a simply supported disc is examined. (Author)

AD-631 770 Fld. 20/11
UNIVERSITY COLL CORK (EIRE)
THE LAMBDA-METHOD FOR SKEW PLATES,
by P. M. Quinlan. 1960. 17p. Contract AF-EOAR-61-4.

Unclassified report

See also AD-233 280, -254 446.

Availability: Published in Proceedings of the U.S. National Congress of Applied Mechanics. (4th) Copies to DDC users only.

Descriptors: (*Metal plates, Loading (Mechanics)), Sheets, Fourier analysis, Series, Green's function, Differential equations, Boundary value problems, Shear stresses, Ireland

A comprehensive method of setting up the skew-plate problem, under all boundary conditions and loadings, is presented. The results, for the concentrated load case, are given in the form of a single infinite series involving root functions. The necessary calculus for differentiating and integrating these functions is then established, leading to the deduction of the distributed load whether distributed over a line or over a parallelogram similar to the plate. By treating a concentrated moment as a force pair, this case follows by differentiation of the concentrated load case. The boundary conditions are reduced to a truncated set of simultaneous equations, which can readily be programmed for solution on an electronic computer.

AD-631 773 Fld. 20/11, 13/13, 15/6
CFSTI Prices: HC $4.60 MF $0.50
RAND CORP SANTA MONICA CALIF
ON THE EFFECTS OF SOURCE PROXIMITY ON THE DYNAMIC STRESSES AROUND A CYLINDRICAL CAVITY,
by M. T. Jakub, and C. C. Mow. Apr 66, 48p. Rept. no. RM-4893-PR, Contract AF 49 (638)-1700,

Unclassified report

Descriptors: (*Nuclear explosion damage, *Underground structures), (*Cylindrical bodies, Stresses), Shock waves, Diffraction, Frequency, Mechanical waves

An analysis is presented and numerical results are given of the interaction of a cylindrical wave impinging on a cylindrical cavity. It is assumed that a line source is located at an arbitrary distance from the cavity and that its strength varies harmonically in time. The resulting dynamic-stress-concentration factors around the cavity were determined by considering the wave-diffraction effects around the cavity. Numerical results indicate that the dynamic-stress-concentration factors around the cavity are dependent upon (1) distance from the source to the cavity, (2) wave numbers, and (3) the Poisson ratio of the medium. It is also shown that at high wave number (high frequency) the cylindrical-incident-wave problem becomes almost identical to the plane-wave problem; however, at low wave number, the solution presented in this Memorandum departs drastically from all previous investigations where the incident wave is assumed to be a plane wave. Stress-concentration factors as much as 66 percent higher than those determined in earlier studies were noted in the present analysis. (Author)

AD-631 816 Fld. 20/11
CFSTI Prices: HC $3.60 MF $0.50
DEFENSE RESEARCH LAB UNIV OF TEXAS AUSTIN
ON LONGITUDINAL AND TRANSVERSE WAVES IN ELASTIC RODS,
by H. J. Plass, Jr., 10 Nov 54, 33p. Rept. no. DRL-362.CM-821
Contract NOrd-9195, Task UTX-1.

Unclassified report

Descriptors: (*Mechanical waves, *Rods), Elasticity, Stresses, Strain (Mechanics), Propagation, Equations of motion

The approximate equations governing the longitudinal and transverse motions of elastic rods are derived from the exact equations of motion of an elastic solid by making certain assumptions about the deformations in the rod. Both the slab (two-dimensional plane strain problem) and the circular cylindrical rod are considered. It is found that the equations for longitudinal waves agree with those obtained by Mindlin and Herrman, and by Volterra. In the case of transverse waves, it is found that there is a fundamental difference between the equations derived in this report and those of Timoshenko and Flugge. The present theory predicts that discontinuities in moment are propagated at the dilatational velocity, and that discontinuities in shear force are propagated at the shear velocity. The corresponding velocities in the Timoshenko-Flugge theory are both smaller. (Author)

AD-631 334 **See Fld. 11/4**

AD-631 342 **See Fld. 14/2**

AD-631 348 **See Fld. 1/3**

AD-631 349 **See Fld. 1/3**

AD-631 365 **See Fld. 1/3**

AD-631 388 **See Fld. 11/6**

AD-631 390 **See Fld. 1/3**

AD-631 501 **See Fld. 13/13**

AD-631 572 **See Fld. 1/3**

AD-631 573 **See Fld. 1/3**

AD-631 574 **See Fld. 1/3**

AD-631 575 **See Fld. 1/3**

AD-631 643 **See Fld. 22/2**

AD-631 713 **See Fld. 22/2**

AD-631 793 **See Fld. 16/4**

AD-631 828 **See Fld. 22/2**

20/12. SOLID STATE PHYSICS

AD-631 203 Fld. 20/12
ILLINOIS UNIV URBANA DEPT OF PHYSICS
DIFFUSION OF THE CHLORINE ION IN POTASSIUM CHLORIDE,
by Robert G. Fuller. 8 Sep 65, 6p. Contract Nonr-1834 (19)

Unclassified report

See also PB-152 884.

Availability: Published in The Physical Review v142 n2 p524-9 Feb 11 1966. Copies to DDC users only.

Descriptors: (*Potassium compounds, Chlorides), (*Chlorine, Ions), Single crystals, Crystal lattice defects, Diffusion, Diffusivity, Solid state physics, Temperature

The diffusion coefficient of the chlorine ion was measured in pure single crystals of potassium chloride and in crystals containing mole fractions of strontium chloride between 0.000021 and 0.000469. The results were consistent with the assumption that both anion vacancies and vacancy pairs contribute to the diffusion of the chlorine ion. The diffusion coefficient of the chlorine ion in pure potassium chloride was well represented by the equation D = 61 exp (-2.12 plus or minus 0.05 eV/kT) sq cm/sec from 560 to 760C. The anion-vacancy contribution to the chlorine-ion diffusion coefficient in pure potassium chloride was D (a) = 36.5 exp (- (2.10 eV)/kT) sq cm/sec and the mole fraction of Schottky defects was n (o) = 43.9 Xexp ((2.31 eV)/2kT). The jump activation energy of the anion vacancy was 0.95 eV. The vacancy-pair contribution to the diffusion coefficient of the chlorine ion was D (p) = 856 exp (- (2.65 eV)/kT) sq cm/sec. These results are in good agreement with theory. Below 560C, experimental diffusion coefficients in pure potassium chloride were too large to be interpreted in terms of anion-vacancy and vacancy-pair diffusion. Similar, anomalous behavior was found below 645C in crystals containing 469 ppm of strontium. (Author)

AD-631 264 Fld. 20/12, 11/6
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF PURE PHYSICS
THE LOW TEMPERATURE TRANSPORT PROPERTIES OF THE PALLADIUM-SILVER ALLOY SERIES.
Revised ed.,
by J. S. Dugdale, and A. M. Guenault. 2 Oct 65, 11p.
NRC 8865

Unclassified report

Revision of manuscript submitted 23 Aug 65.

Availability: Published in Philosophical Magazine v13 n123 p503-13 Mar 1966. Copies to DDC users only.

Descriptors: (*Palladium alloys, Transport properties), (*Silver alloys, Transport properties), (*Thermoelectric effect, Low-temperature research), (*Band theory of solids, Thermoelectric effect), Thermodynamics, Specific heat, Theory, Resistance (Electrical), Electrons, Carriers (Semiconductors), Atomic energy levels, Canada

A simple model of the electronic structure of the palladium-silver alloy series was set up that is consistent with what is known about the Fermi surface of pure palladium and the general thermodynamic behaviour of the alloys. It is shown that the model can explain the concentration dependence of the resistivity (both residual and room temperature) at least as well as the earlier calculations of Coles and Taylor. It is also shown that the model can account for the magnitude of the low temperature thermopower in the palladium-rich alloys. (Author)

AD-631 278 Fld. 20/12, 18/8
CFSTI Prices: HC $2.00 MF $0.50
PARKE MATHEMATICAL LABS INC CARLISLE MASS
ATOMIC CASCADE MODELS.
Scientific rept.,
by Charles H. Sherman, and Nan E. Gordon. Feb 66, 32p. Rept. no. Scientific-6,
Contract AF 19(628)-2419, Proj. AF-5620,
Task 562001,
AFCRL 66-164

Unclassified report

Descriptors: (*Radiation damage, Mathematical models), (*Crystals, Radiation damage), (*Atoms, Mathematical models), Electron bombardment, Energy, Scattering, Numerical analysis

A model for cascades of atomic displacements was developed which is basically the same as earlier models but more general in its treatment of replacement collisions and energy lost to other lattice atoms when an atom is displaced. Simple analytical expressions were obtained for the average number of displacements produced per primary which are sufficiently accurate considering the uncertainties in the basic assumptions. Various specific cases of the model are illustrated numerically and discussed briefly relative to the possibility of using electron irradiation data to determine some of the parameters in the model. (Author)

AD-631 317 Fld. 20/12, 20/3, 11/6, 20/2
CFSTI Prices: HC $2.00 MF $0.50
FRANKLIN INST RESEARCH LABS PHILADELPHIA PA
RESEARCH ON STRUCTURE AND MAGNETIC PROPERTIES OF EXPITAXIALLY GROWN MAGNETIC FILMS.
Final scientific rept., 17 Dec 62-16 Dec 65,
by W. D. Doyle, A. Baltz, J. Drew, and P. Flanders. 28 Feb 66, 44p. Rept. no. F-B2046,
Contract AF 19(628)-2415, Proj. AF-5635,
Task 563503,
AFCRL 66-179

Unclassified report

See also AD-603 720.

Descriptors: (*Metal films, Magnetic properties), (*Magnetic materials, Films), Epitaxial growth, Single crystals, Cobalt, Crystal lattices, Nickel alloys, Iron alloys, Anisotropy, Quartz, Torque, Isotropism, Aging (Materials), Magnetostriction

Three major areas have been investigated. (1) An investigation of the role of imperfections in magnetic thin films has been conducted and a strong emphasis in this effort has been placed upon epitaxial properties. The results include an evaluation of voids in aged single crystals, an analysis of face-centered-cubic single crystal cobalt films and an investigation of 'ripple' as related to crystallographic properties of the epitaxial films. (2) A program to investigate the properties and origin of strip domains in various NiFe thin films was initiated. Methods for observing these domains were perfected and properties evaluated as a function of film fabrication parameters. (3) A large uniaxial anisotropy has been observed in NiFe films deposited on single crystal quartz substrates. Subsequent investigations show that its origin is a substrate-film constraint mechanism related to the planar strain system developed because of a difference in coefficients of the thermal expansion of the quartz and NiFe film. (Author)

AD-631 367 Fld. 20/12, 9/1, 18/8
CFSTI Prices: HC $8.60 MF $0.75
NORTRONICS NEWBURY PARK CALIF APPLIED RESEARCH DEPT
GENERALIZED MODEL FOR SEMICONDUCTOR RADIATION RESPONSE PREDICTION.
Quarterly progress rept. no. 3, 15 Jun-15 Sep 65,
by James P. Raymond, William W. Chang, and Robert E. Johnson. Mar 66, 90p. Rept. no. NARD-65-18R,
Contract DA-28-043-AMC-00423(E), Proj. DA-5900.21.830.23,
ECOM 00423-3

Unclassified report

See also AD-625 341.

Descriptors: (*Semiconductor devices, *Radiation damage), (*Transistors, Radiation damage), (*Photoelectric effect (Gamma rays), Mathematical prediction), Transients, Mathematical models, Diodes (Semiconductor), Electric fields, Carriers (Semiconductors)

Work was primarily analytical and devoted to the characterization of the 'second-order' effects which significantly influence the transient response of practical transistors. Previously, the lumped-model technique was applied to the one-dimensional diffusion models of the junction diode and transistor. It was assumed in all cases that the lumped model parameters were independent of the junction bias voltages and terminal currents. There are three serious deviations from the 'ideal' model in a practical transistor: the two-dimensional nature of the base region, the variation of the transistor current gain with emitter current, and the electric field effects induced in the high-resistivity collector region. The lumped-model technique was used to extend the transistor model to include all three effects. (Author)

AD-631 532 Fld. 20/12, 20/13
DUKE UNIV DURHAM N C DEPT OF PHYSICS
SPECIFIC HEAT OF FOUR RARE-EARTH COMPOUNDS BETWEEN 0.4 AND 5K DEGREES.
by David G. Onn, Roland Gonano, and Horst Meyer. 1965, 4p.

Unclassified report

Availability: Published in Low Temperature Physics -LT9 (Part B) p897-900 1965. Copies to DDC users only.

Descriptors: (*Rare earth compounds, Specific heat), Lanthanum compounds, Holmium compounds, Aliphatic compounds, Complex compounds, Garnet, Gadolinium compounds, Iron compounds, Lutecium compounds, Cryogenics

The specific heats of lanthanum and holmium ethylsulfate (LaES and HoES) and of lutetium and gadolinium iron garnet (LuIG and GdIG) were measured by means of a cryostat using liquid He-3 or He-4.

AD-631 612 Fld. 20/12, 9/1, 20/2
CFSTI Prices: HC $5.00 MF $1.00
INTERNATIONAL BUSINESS MACHINES CORP HOPEWELL JUNCTION N Y COMPONENTS DEPT
SEMICONDUCTOR JUNCTION PROPERTIES AS INFLUENCED BY CRYSTALLOGRAPHIC IMPERFECTIONS.
Interim rept. 15 Feb 65-15 Feb 66,
by G. H. Schwuttke. Mar 66, 165p. Rept. no. Scientific-1,TR-22.234
Contract AF 19(628)-5059, Proj. AF-5621,
Task 562104,
AFCRL 66-192

Unclassified report

Descriptors: (*Semiconductors, *Crystal lattice defects), Performance (Engineering), Semiconductor devices, Impurities, Diffusion, Gold, Zinc, Silicon, Gallium alloys, Arsenic alloys, Chemical precipitation, Boron, Microscopy, Transistors, Crystal structure

Studies are reported on the influence of crystallographic imperfections on semiconductor junction performance. X-ray diffraction phenomena of junctions are correlated with device performance. Imperfections created during diffusion processes have a significant impact on devices. Precipitation is observed after gold diffusion, and the influence of this effect on the fabrication of fast switching devices is investigated. Precipitation is also shown to play a major role in the emitter dip effect; evidence is presented that a faulted emitter structure can cause second breakdown. Defect distributions are correlated with electrical junction profiles, and localized diffusions are found to cause breakdown of the silicon lattice. Zinc diffusion into GaAs is found to create lattice defects; x-ray junction profiles are correlated with zinc concentration profiles. Finally, dislocations and dislocation sources in web-dendrite crystals are analyzed. (Author)

AD-631 698 Fld. 20/12, 20/2, 7/4
CFSTI Prices: HC $4.60 MF $0.50
FRANKLIN INST RESEARCH LABS PHILADELPHIA PA CHEMISTRY DIV
DIFFUSION IN ORGANIC CRYSTALS.
Semi-annual technical rept., 1 Oct 65-31 Mar 66. 31 Mar 66, 44p. Rept. no. B2130-T-9,
Contract DA-31-124-ARO(D)-142,ARPA Order-462 Proj. ARO(D)-4168P
AROD 4168:9

Unclassified report

Descriptors: (*Anthracenes, Crystallography), (*Phenanthrenes, Diffusion), (*Fluorenes, Diffusion), (*Organic materials, Crystals), Anisotropy, Impurities, Grain boundaries, Carriers (Semiconductors), Crystal growth

Studies on the diffusion of phenanthrene and fluorence in anthracene crystals showed that the general order of magnitude of diffusivity is comparable to self-diffusion in the case of phenanthrene and three to six times slower in the case of fluorene. Anisotropy can be observed for impurity diffusion. The diffusion rate perpendicular to the ac plane is generally two to three times faster than that perpendicular to the ab plane. Evidence for sub-grain boundary diffusion in addition to a slower lattice diffusion process was obtained in the case of phenanthrene and self-diffusion in melt-grown anthracene crystals. Melt-grown anthracene crystals were evaluated by carrier trapping lifetime studies. In general the longest lifetimes are obtained in crystals where care has been taken to exclude air when zone refined material is transferred to a crystal growing environment. Attempts were made to control the orientation of anthracene crystals grown from the melt. The seed crystal technique appears to be the most successful method judging by the results obtained so far. (Author)

AD-631 711 Fld. 20/12, 20/9, 20/5
CFSTI Prices: HC $2.00 MF $0.50
BOEING SCIENTIFIC RESEARCH LABS SEATTLE WASH PLASMA PHYSICS LAB
THE FORMATION OF A MAGNETIC PINCH IN INSB AND THE POSSIBILITY OF POPULATION INVERSION IN THE PINCH,
by Helmut Schmidt. Feb 66, 41p. Rept. no. D1-82-0502,

Unclassified report

Descriptors: (*Plasma medium, Simulation), (*Semiconductors, *Magnetic pinch), (*Indium alloys, Antimony alloys), (*Lasers, Semiconductor devices), Electrons, Carriers (Semiconductors), Phonons, Magnetic fields, Crystal lattices, Ionization, Hall effect, Atomic energy levels, Emissivity, Electron transitions, Photons

A sufficiently strong current supported by an electron -hole plasma in InSb pinches. As the electron-hole gas is compressed by the current's magnetic field, the plasma temperature increases. The strong electron -phonon coupling, however, keeps the plasma temperature below the characteristic temperature of the optical phonons as long as the lattice remains cold. This early period of the pinch, which includes the initial contraction and some 0.0000001 sec thereafter, is discussed. The collapse of the pinch may be halted by an increase of the plasma pressure caused by the exclusion principle or by the occurence of impact ionization in the pinch's radial Hall field. An estimate of the particle density in the pinch shows that the conditions for population inversion may be satisfied, hence laser action due to stimulated electron-hole recombination might occur. This effect should influence the development of the pinch decisively. (Author)

AD-631 740 Fld. 20/12
CFSTI Prices: HC $1.00 MF $0.50
DELAWARE UNIV NEWARK DEPT OF PHYSICS
STATIONARY SOLUTIONS FOR INHOMOGENEOUS FIELD DISTRIBUTION IN HOMOGENEOUS SEMICONDUCTORS IN A RANGE OF NEGATIVE DIFFERENTIAL CONDUCTIVITY.
Technical rept.,
by K. W. Boer, and P. L. Quinn. Apr 66, 17p.
Rept. no. TR-6,
Contract DA-31-124-ARO (D)-173,
AROD 4461:6

Unclassified report

Descriptors: (*Semiconductors, Reaction kinetics), Mathematical models, Differential equations, Electrical conductance, Carriers (Semiconductors), Field theory

For a simple reaction-kinetic model of a homogeneous semiconductor layer-like field inhomogeneities have been shown to occur if and only if the decrease in conductivity is stronger than linear with increasing field. Such negative differential conductivity may be the result of either a field-dependent carrier concentration or a field-dependent mobility. The paper discusses the stationary solutions of a system of differential equations representing the reaction-kinetic models of both these cases.

AD-631 744 Fld. 20/12, 20/2
STANFORD UNIV CALIF DEPT OF MATERIALS SCIENCE
FURTHER CONSIDERATIONS ON A THEORY OF SUPERLINEARITY IN CDS AND RELATED MATERIALS,
by Gustavo A. Dussel, and Richard H. Bube. 22 Apr 65, 9p. Contract DA-31-124-ARO (D)-73, AROD 4119:7

Unclassified report

Availability: Published in Journal of Applied Physics v37 n1 p13-21 Jan 1966. Copies to DDC users only.

Descriptors: (*Semiconductors, *Photoconductivity), (*Carriers (Semiconductors), Photoconductivity), (*Cadmium compounds, Sulfides), Selenides, Single crystals, Ionization, Electron transitions, Band theory of solids

A theory of superlinearity by Cardon and Bube is extended by considering the effect of a high density of shallow traps, either discrete or with a quasiexponential distribution. New conditions for the breakpoints of superlinearity are introduced. These new conditions allow the explanation of several features of superlinearity in sintered layers, including the 'anomalous' observation of lifetime decrease above the superlinear region, as described in investigations on CdSe by Stupp. A possible relationship between such trap distributions and an apparent decrease in sensitizing center hole ionization energy in highly impure single crystals of CdS is suggested. A summary of all the basic superlinearity conditions is given, with principal emphasis on the physics of the involved mechanisms. (Author)

AD-631 791 Fld. 20/12
STANFORD UNIV CALIF DEPT OF MATERIALS SCIENCE
DETERMINATION OF ELECTRON TRAPPING PARAMETERS,
by Richard H. Bube, Gustavo A. Dussel, Ching-TaoHo, and Lewis D. Miller. 21 May 65, 11p. Contract DA-31-124-ARO (D)-73, AROD 4119:8

Unclassified report

Availability: Published in Journal of Applied Physics v37 n1 p21-31 Jan 1966. Copies to DDC users only.

Descriptors: (*Semiconductors, Electron capture), (*Carriers (Semiconductors), Mathematical analysis), Cadmium compounds, Sulfides, Selenides, Photoconductivity, Thermal properties, Probability, Crystals, Electrons

A detailed investigation of different methods for determining electron trap parameters was made on crystals of CdS-CdSe. The principal techniques involved are decay of photoconductivity and thermally stimulated conductivity (TSC). Direct evidence of a quasicontinuous trap distribution with total density of 5X10 to the 15th power/cu cm, trap depth range of 0.1-0.7 eV, and capture cross sections of the order of 10 to the -16th power sq cm is obtained, for which correct values of the parameters can be calculated from Fermi-level analysis of either decay or TSC data. In the same crystals a discrete trap level with density of 2X10 to the 14th power /cu cm, depth of 0.73 eV, and apparent cross section of 10 to the -14th power sq cm is also found. In spite of the large value of cross section derived from the freeing of trapped electrons, these traps exactly obey monomolecular kinetics. A temperature threshold at 180K is found, below which it is not possible to fill these traps. Examination of a number of possibilities favors the proposal that these traps are characterized by a Coulomb -repulsive barrier. (Author)

AD-631 819 Fld. 20/12, 20/2, 9/1
CARNEGIE INST OF TECH PITTSBURGH PA DEPT OF ELECTRICAL ENGINEERING
PREPARATION OF GE/SI AND GE/GAAS HETEROJUNCTIONS.
Revised ed.,
by A. R. Riben, D. L. Feucht, and W. G. Oldham. 18 Nov 65, 5p. Contract DA-31-124-ARO (D)-131,
AROD 3397:12

Unclassified report

Revision of manuscript submitted 16 Jun 65.

Availability: Published in Journal of the Electrochemical Society v113 n3 p245-9 Mar 1966. Copies to DDC users only.

Descriptors: (*Semiconductors, Surface properties), (*Germanium, Crystal growth), Substrates, Silicon, Gallium alloys, Arsenic alloys, Vapor plating, Preparation, Crystal lattice defects, Epitaxial growth, Vacuum apparatus

The effect of various substrate preparation techniques is investigated in the vapor growth of germanium on Ge, Si, and GaAs substrates. Important differences are noted for substrates which are iodine etched in situ, chemically etched, and cleaved in situ; namely, the appearance and crystal perfection of the overgrowth as well as epitaxial junction properties, all improve in the order of the above procedures. Flat, structureless overgrowths on cleaved GaAs substrates and growths with negligible stacking fault densities and dislocation densities of approximately 1,000,000/sq cm on cleaved germanium substrates are obtained. However, strain and cracking of the overgrowth, in addition to higher defect densities occur in germanium grown on cleaved silicon substrates. (Author)

AD-631 820 Fld. 20/12, 20/2, 9/1
CARNEGIE INST OF TECH PITTSBURGH PA DEPT OF ELECTRICAL ENGINEERING
THE CAPACITANCE OF DOUBLE SATURATION N GE--N SI HETEROJUNCTIONS,
by J. P. Donnelly, and A. G. Milnes. 13 Oct 65, 1p. Contract DA-31-124-ARO (D)-131, AROD 3397:10

Unclassified report

Availability: Published in Proceedings of the IEEE v53 n12 p2109 Dec 1965. Copies to DDC users only.

Descriptors: (*Semiconductors, Surface properties), Germanium, Silicon, Diodes (Semiconductor), Capacitance, Crystal lattice defects, Grain boundaries

The capacitances of n Ge-n Si double saturation heterojunctions are similar to those found in grain boundary structures and are consistent with the current -voltage and photovoltaic characteristics of these junctions. The number of charbed interface states obtained by using the extrapolated diffusion voltages are compatible with those expected in Ge-Si junctions from simple lattice mismatch considerations. (Author)

AD-631 297 See Fld. 20/3

AD-631 298 See Fld. 9/1

AD-631 302 See Fld. 20/2

AD-631 316 See Fld. 7/4

AD-631 347 See Fld. 9/5

AD-631 411 See Fld. 5/1

AD-631 499 See Fld. 20/5

AD-631 546 See Fld. 9/3

AD-631 622 See Fld. 14/5

AD-631 636 See Fld. 9/1

AD-631 676 See Fld. 20/6

AD-631 712 See Fld. 5/1

AD-631 792 See Fld. 20/2

AD-631 818 See Fld. 20/2

AD-631 831 See Fld. 11/9

20/13. THERMODYNAMICS

AD-631 200 Fld. 20/13
CFSTI Prices: HC $2.00 MF $0.50
GEORGIA INST OF TECH ATLANTA ENGINEERING EXPERIMENT STATION
MEASUREMENT OF THE TRUE SPECIFIC HEAT OF SILVER, NICKEL, BETA-BRASS, QUARTZ AND QUARTZ GLASS BETWEEN 50 AND 700C BY AN IMPROVED METHOD.
Research translation.

by Helmut Moser. Feb 66, 50p. Rept. no. G-T-G-65-9,
Contract AF 19 (628)-5034,
TT 66-61041

Unclassified report

Messung der Wahren Spezifischen Warme von Silber, Nickel, Beta-Messing, Quarzkristall und Quarzglas Zwischen +50 und 700 degrees nach einer Verfeinerten Methode, trans. of Physikalische Zeitschrift (Germany) v37 p737-53 1936.

Descriptors: (*Specific heat, Measurement), (*Silver, Specific heat), (*Nickel, Specific heat), (*Brass, Specific heat), (*Quartz, Specific heat), Glass, Calorimeters, Argon, Vacuum, Temperature, Transition temperature, Germany

A silver calorimeter, equipped with a resistance heating element which surrounds the sample, is placed in an electric furnace whose temperature can be brought to 700C at constant rate. The calorimeter is held in an argon atmosphere at reduced pressure. The method permits measurement of true specific heat of solids between + 50 and + 700C within 0.5 percent (absolute), with suitable calorimeter construction and consideration of all sources of error. The measurements of true specific heat of silver, nickel, beta-brass, crystalline quartz and amorphous quartz show even smaller relative deviations.

AD-631 280 Fld. 20/13
CFSTI Prices: HC $1.00 MF $0.50
STANFORD UNIV CALIF DEPT OF MECHANICAL ENGINEERING
HEAT TRANSFER DURING SUBCOOLED BOILING.
Final rept., 16 Feb 59-14 Feb 66,
by George Leppert. 14 Feb 66, 4p. Rept. no. P-2257,
Contract DA-ARO (D)-31-124-G13,
AROD 2257:7

Unclassified report

See also AD-405 022.

Descriptors: (*Heat transfer, Boiling), Nuclear boiling, Cylindrical bodies, Convection (Heat transfer), Heat transfer coefficients, Boundary layer, Reynolds number, Viscosity, Liquids, Water, Film boiling, Heat flux

(1) Average heat transfer coefficients on a uniformly heated cylinder. Experimental data were presented for a Reynolds number range from 40 to 100,000 and for Prandtl numbers from 1 to 300. The effects of temperature differences large enough to produce significant changes in viscosity across the boundary layer were correlated in terms of a viscosity ratio. (2) Local heat transfer coefficients on a uniformly heated cylinder. Analysis of the heat transfer in the laminar boundary layer using integral methods was compared with original experimental measurements of the local heat transfer coefficients around a cylinder. (3) Critical heat flux for nearly saturated water flowing normal to a cylinder. Visual and photographic observations were used to construct a physical model of transition from nucleate to film boiling. (4) Critical heat flux for subcooled water flowing normal to a cylinder. The maximum flux which can be accommodated in subcooled nucleate boiling varies directly with the velocity and subcooling and inversely with a fractional power of the heater diameter.

AD-631 356 Fld. 20/13, 22/3
CFSTI Prices: HC $4.60 MF $0.50
ROME UNIV (ITALY) SCUOLA DI INGEGNERIA AERONAUTICA
A METHOD FOR SOLVING NON-LINEAR THERMAL PROBLEMS IN RE-ENTRY OF SPACE VEHICLES.
Technical note,
by Luigi Broglio. Jul 61, 43p. Rept. no. SIARgraph-58,TN-1
Contract AF 61 (052)-429,

Unclassified report

Descriptors: (*Atmosphere entry, *Thermodynamics), (*Reentry vehicles, Thermodynamics), Aerodynamic heating, Spacecraft, Heat transfer, Heat transfer coefficients, Convection (Heat transfer), Thermal radiation, Nonlinear systems, Mathematical analysis

In Part I a body of whatever shape is considered, of volume V, bounded by one or more surfaces S, and with thermal coefficients K and c (conductivity and specific heat, respectively). It is assumed that the geometry of the body and the coefficients c and K not to change with time. The body, initially at known temperature, is assumed to be heated by a distribution of heat sources of any variation with space and time. It is shown that it is possible to find a rigorous analytic solution of the problem, provided the sources distribution be a function of space coordinates and of time and satisfy prescribed regularity conditions. In Part II the same problem of Part I is considered, but it is assumed that the heat sources distribution be not known 'a priori', but be also depending on the values of temperature calculated at the same time or at foregoing values of time. It is shown that, in this case, by using again the solution of P. I, the problem reduces to an integral equation of Volterra's type, which can be easily integrated by steps or by successive approximations. In Part III a body is considered whose geometry and thermal coefficients K and c are time-varying. (Author)

AD-631 357 Fld. 20/13, 13/1, 22/2
CFSTI Prices: HC $4.60 MF $0.50
ROME UNIV (ITALY) SCUOLA DI INGEGNERIA AERONAUTICA
HEAT TRANSFER MEASUREMENTS ON CONDENSING SODIUM VAPORS FOR SPACE RADIATOR DESIGN.
Technical note,
by Luigi Broglio, Giorgio Ravelli, and Carlo Buongiorno. Aug 61, 43p. Rept. no. SIARgraph 59,TN-2
Contract AF 61 (052)-429,

Unclassified report

Descriptors: (*Condensers (Liquefiers), Radiators), (*Radiators, Spacecraft components), (*Heat transfer, *Sodium), Metals, Vapors, Heat transfer coefficients, Liquid metal coolants, Space propulsion, Electric power production, Turbines

The note deals with the determination of the heat transfer rates from condensing sodium vapor at vapor temperatures of 680C and 540C. These data are particularly important for the design of a radiator condenser for a turbogenerating power plant for spacecraft. An experimental analysis has been carried out for two different type of condensing tubes. The preliminary theoretical analysis, the experimental apparatus and the results are herewith presented. (Author)

AD-631 371 Fld. 20/13, 20/4
MINNESOTA UNIV MINNEAPOLIS HEAT TRANSFER LAB
EXPERIMENTS ON THE DIFFUSION THERMO EFFECT IN A BINARY BOUNDARY LAYER WITH INJECTION OF VARIOUS GASES,
by E. M. Sparrow, C. J. Scott, R. J. Forstrom, and W. A. Ebert. 23 Jul 64, 8p. Contract AF-AFOSR-17-65,
AFOSR 66-0331

Unclassified report

Presented at the American Society of Mechanical Engineers Winter Annual Meeting, New York City, 29 Nov-3 Dec 64 as paper no. 64-WA/HT-1.

Availability: Published in Journal of Heat Transfer Aug 1965. Copies to DDC users only.

Descriptors: (*Diffusion, Thermodynamics), (*Boundary layer, Cylindrical bodies), (*Cylindrical bodies, Transport properties), (*Thermodynamics, Boundary layer), Heat transfer, Mass transfer, Convection (Heat transfer), Porous materials, Injection, Gas flow, Temperature, Carbon dioxide

The free convection heat and mass transfer about a porous horizontal cylinder are investigated experimentally. Various gases, which are either preheated or precooled, are injected through the porous cylinder into an otherwise quiescent air environment. The gases include hydrogen, helium, carbon dioxide, and Freon-12; the first two of these have molecular weights less than that of air while the latter two have molecular weights greater than that of air. It is found that for the condition of no net heat transfer at the surface, the temperature of the surface differs from the temperature of the environment. The existence of the aforementioned adiabatic wall temperature is due to the diffusion thermo effect. When hydrogen or helium is the injected gas, the adiabatic wall temperature exceeds the ambient temperature by as much as 100F. On the other hand, when carbon dioxide or Freon-12 is the injected gas, the deviation between adiabatic wall and ambient temperatures is both much smaller and of opposite sign relative to that noted previously. (Author)

AD-631 394 Fld. 20/13
CFSTI Prices: HC $4.60 MF $0.50
TECHNION - ISRAEL INST OF TECH HAIFA
UNSTEADY TRANSFER OF HEAT IN GASES.
Technical rept.,
by Meir Hanin. Jul 61, 49p. Contract AF 61 (052)-389,

Unclassified report

Descriptors: (*Gases, *Heat transfer), Theory, Temperature, Partial differential equations, Integral transforms, Time, Pressure, Physical properties, Israel

A study is made of the changes of state and the motions which are produced in a thermally conducting viscous gas, initially resting in a uniform state, when the temperature of its plane boundary is rised or lowered. Evaluation of the temperature, pressure and density variations in the gas and of the velocity of the induced motion is made by linearizing the equations of momentum (Navier-Stokes), continuity, energy and state, and solving with the aid of the Laplace transformation. The results include (1) formulas giving the variation with time of the heat-transfer rate and the pressure at the boundary, (2) as asymptotic solution giving the changes of state and the motion of the gas at large times, (3) a power-series solution for small times. Conclusions are drawn from these results regarding the physical properties of the unsteady heat transfer in a gas. (Author)

AD-631 534 Fld. 20/13
NATIONAL BUREAU OF STANDARDS WASHINGTON D C
HEAT OF COMBUSTION AND HEAT OF FORMATION OF ALUMINUM CARBIDE,
by R. C. King, and G. T. Armstrong. 14 Aug 64, 8p. Rept. no. ISSA-65-8,
AFOSR 66-0353

Unclassified report

Availability: Published in Journal of Research of the National Bureau of Standards, A. Physics and Chemistry v68A n6 p661-8 Nov-Dec 1964. Copies to DDC users only.

Descriptors: (*Heat of formation, Aluminum compounds), (*Aluminum compounds, Carbides), Thermodynamics, Carbon dioxide, Aluminum compounds, Oxides, Calorimetry

The heat of combustion of aluminum carbide (Al_4O_3) in oxygen was measured by means of bomb calorimetry. The solid product of the combustion consisted of alpha aluminum oxide and another crystalline form of alumina, which was characterized as delta alumina. The heats of combustion were corrected for the formation of the delta aluminum oxide. The results when combined

with the heats of formation of alpha aluminum oxide and carbon dioxide, yielded -49.7 kcal/mole for the standard heat of formation of aluminum carbide at 298.151K with an estimated overall uncertainty of plus or minus 1.2 kcal/mole. (Author)

AD-631 616 Fld. 20/13, 7/4
WARNER AND SWASEY CO FLUSHING N Y
DETERMINATION OF HOT-GAS TEMPERATURE PROFILES FROM INFRARED EMISSION AND ABSORPTION SPECTRA.
Revised ed.,
by Burton Krakow. 31 Mar 65, 3p. Contract AF 49 (638)-1132,
AFOSR 66-0352
Unclassified report

Presented at the AIAA Aerospace Sciences Meeting, (2nd), New York, N. Y., 25-27 Jan 65. See also AD-622 691.

Availability: Published in AIAA Journal v3 n7 p1359-60 1965. Copies to DDC users only.

Descriptors: (*Gases, Thermodynamics), (*Thermodynamics, *Infrared spectroscopy), Carbon dioxide, Spectra (Infrared), Absorption spectrum, Infrared radiation, Temperature, Flames, Theory, Equations

Emittance equations and methods of solution are derived for the temperature gradients existing in a gas. The method was tested by measurements of known temperature profiles of hot CO2 produced by flames on flat frame burners. The temperature profile as calculated by means of an iteration scheme agreed well with the zonal temperatures determined by an infrared brightness method.

AD-631 710 Fld. 20/13, 22/2
CFSTI Prices: HC $1.00 MF $0.50
BOEING SCIENTIFIC RESEARCH LABS SEATTLE WASH GEO-ASTRO PHYSICS LAB
TRANSIENT TEMPERATURES OF THIN PLATES AND SHELLS RADIATING IN A VACUUM,
by D. F. Winter. Mar 66, 14p. Rept. no. D1-82-0509,
Unclassified report

Descriptors: (*Thermal radiation, Structural parts), (*Structural shells, Thermal radiation), (*Flat plate models, Thermal radiation), Vacuum, Satellites (Artificial), Mathematical analysis, Temperature, Surfaces

When certain conditions are satisfied, radiative exchange predominates over other modes of heat transport within evacuated arrays of thin parallel plates, concentric cylindrical, or spherical shells. The system of equations which provides the transient temperature of each plate or shell of such an array is displayed. Approximate analytic solutions are presented for small values of time for the case of uniform initial temperature. A steady-state solution is also presented, together with certain numerical results for general values of time. The temperature histories of such arrays may serve to indicate the character of the temperature response of more complex evacuated particulate media in which radiative transport of heat energy predominates. Such a situation may prevail in the case of certain planetary and satellite surfaces. (Author)

AD-631 806 Fld. 20/13
CFSTI Prices: HC $2.00 MF $0.50
NEW YORK UNIV N Y DEPT OF PHYSICS
LOW TEMPERATURE PROPERTIES OF LIQUID HE3,
by A. E. Glassgold. Sep 65, 33p. Rept. no. tr-A65-4,
Contract DA-ARO (D)-31-124-G523,
AROD 4614:5
Unclassified report

Presented at the International Symposium on Inelastic Scattering of Neutrons from Condensed Systems, Brookhaven National Lab., September 20-22 1965.

Descriptors: (*Helium, *Cryogenics), Liquefied gases, Superfluidity, Sound, Theory, Excitation, Low-pressure research, Equations of state

A review is presented of simple theoretical concepts and current experimental results on the properties of liquid helium-3 at low temperatures and low pressures. Some of the topics covered are the extent of experimental confirmation of Landau's theory of the Fermi Liquid; the possible transition into a superfluid phase; the observation of zero-sound; and the importance, and present difficulties, in 'microscopic' probing of the elementary excitations. (Author)

AD-631 283 **See Fld. 7/2**

AD-631 358 **See Fld. 13/1**

AD-631 359 **See Fld. 13/1**

AD-631 387 **See Fld. 20/8**

AD-631 399 **See Fld. 13/1**

AD-631 469 **See Fld. 20/9**

AD-631 531 **See Fld. 8/10**

AD-631 532 **See Fld. 20/12**

AD-631 577 **See Fld. 21/2**

AD-631 581 **See Fld. 13/1**

AD-631 591 **See Fld. 20/9**

AD-631 598 **See Fld. 20/4**

AD-631 737 **See Fld. 20/4**

AD-631 767 **See Fld. 20/5**

AD-631 769 **See Fld. 20/4**

AD-631 775 **See Fld. 14/2**

AD-631 821 **See Fld. 14/2**

20/14. WAVE PROPAGATION

AD-631 227 Fld. 20/14, 4/1
CFSTI Prices: HC $1.00 MF $0.50
NAVAL RESEARCH LAB WASHINGTON DC
ANALYSIS OF ELECTRON CONTENT ERRORS INTRODUCED THROUGH USE OF A SIMPLIFIED FARADAY ROTATION TECHNIQUE.
Memo. rept.,
by John M. Goodman. Feb 66, 20p. Rept. no. NRL-MR-1684,
Unclassified report

Descriptors: (*Ionosphere, *Magneto-optic effect), (*Electron density, Magneto-optic effect), Ionospheric propagation, Radar signals, Communication satellites (Passive), Errors, Analysis, Periodic variations

Faraday rotation has proved to be an exceedingly useful tool in the study of the ionosphere. The amount of rotation of the electric vector of a linearly polarized radio wave is directly proportional to the number of free electrons along the propagation path. Unfortunately the rotation angle at radar frequencies of interest is typically ambiguous. That is to say, the amount of rotation usually exceeds 180 degrees. The rotational ambiguity may be avoided by making certain simplifying assumptions. The ultimate accuracy of the electron content measurements is obviously dependent upon the truthfulness of the assumptions which are embodied in the simplifications. In actuality only one assumption must be made - that of total electron content invariance over a given period of time. This assumption requires that the ionospheric structure be uniform in space and a constant function of time. It also requires that the target be superionospheric. The degree of error introduced by these constraints is the subject of this note. The discussion is specifically directed toward the problem of deducing the columnar electron content between the Randle Cliff radar site and Echo II (1964-4A) satellite. Nevertheless, in principle, the Faraday error analysis may be applied to any satellites. (Author)

AD-631 417 Fld. 20/14, 9/3
CFSTI Prices: HC $6.60 MF $0.75
HINCHMAN CORP DETROIT MICH
REPORT AND CRITERIA OF METHOD OF MEASUREMENT AND RECOMMENDED ALLOWABLE LIMITS OF ELECTROMAGNETIC INTERFERENCE VOLTAGES, FROM HIGH VOLTAGE TRANSMISSION LINES OF THE 132 KV CLASS,
22 Sep 58, 65p. Contract NBy-17792,
Unclassified report

Descriptors: (*Transmission lines, *Radio interference), (*Electromagnetic compatibility, Transmission lines), Voltage, Electric cables, Electromagnetic waves, Propagation, Tolerances (Mechanics), Measuring devices (Electrical + electronic), Electrical engineering

This report presents a method of establishing allowable levels of electromagnetic interference from transmission lines of 70 Kv to 132 Kv. A standard method of making measurements and a graph of allowable limits are included, both based on the field work performed under Phase II of this contract. Recommendations are also included. It has previously been established that it is not economically feasible to prevent all radio interference from high voltage lines, but it is practicable to reduce interference within limits. Contract NOy-88454 called for establishment of methods of measurement and allowable levels of interference on lines below 69 Kv. The present contract is an extension of the same work to higher voltages. Means of suppression and mitigation of electromagnetic interference to acceptable limits will be considered in another report (AD-631 418). (Author)

AD-631 418 Fld. 20/14, 9/3
CFSTI Prices: HC $6.60 MF $0.75
HINCHMAN CORP DETROIT MICH
DESCRIPTION OF THE PROCEDURES AND EQUIPMENT FOR THE SUPPRESSION AND MITIGATION OF ELECTROMAGNETIC INTERFERENCE VOLTAGES FROM TRANSMISSION LINES OF THE 132 KV CLASS TO ACCEPTABLE LEVELS.
5 Nov 58, 66p. Contract NBy-17792,
Unclassified report

See also AD-631 417.

Descriptors: (*Radio interference, *Transmission lines), (*Electromagnetic compatibility, Transmission lines), (*Suppressors, Radio interference), Voltage, Electric cables, Construction, Maintenance, Electric insulation, Electromagnetic shielding, Electromagnetic waves, Radiofrequency interference, Propagation, Reduction, Static eliminators, Electrical engineering

This report presents design and construction considerations necessary to achieve low levels of inherent interference; and also maintenance and investigation procedures required to prevent or eliminate specific sources of interference. This report is applicable to lines of 69 Kv to 132 Kv. The conclusions of this report indicate that the methods and procedures to limit the interference from overhead lines to the acceptable level established in Phase III of this contract, are desirable, feasible, and economically justifiable. For many progres-

sive utility companies, techniques of interference reduction are routine operations. These techniques of interference reduction are: (1) Proper selection and testing of materials, (2) proper construction practices, and (3) proper maintenance procedures. A section of the report is devoted to the economics of construction and maintenance of overhead transmission lines for minimum interference generation. This type of construction and maintenance is desirable for numorous intangible reasons and is, also, economically feasible. Maintenance aimed at interference reduction is, furthermore, preventive maintenance against power outages. Interference sources, when located and repaired, eliminate 'faults' which would probably develop to line outages. (Author)

AD-631 435 Fld. 20/14
CFSTI Prices: HC $13.60 MF $1.00
ELECTRICAL ENGINEERING RESEARCH LAB UNIV OF TEXAS AUSTIN
POWER SPECTRA AND STATISTICAL STUDIES OF OVERWATER SIGNAL STRENGTHS FOR THE GOLDEN GATE CALIFORNIA RADIO PATH,
by F. E. Brooks, Jr., H. W. Smith, and G. P. DuBose, Jr., 31 Jul 54, 132p. Rept. no. EERL-3-16,CM-813
Contract NOrd-9195,
Unclassified report

Descriptors: (*Radio waves, Propagation), (*Electromagnetic wave reflection, Ocean waves), (*Ocean waves, Radio interference), Seacoast, Bays, California, Radio ranges, Radiofrequency power, Statistical analysis, Radar tracking, Water waves, Radiofrequency interference

In the spring of 1953, the Electrical Engineering Research Laboratory made measurements of overwater radio propagation at 3.2 centimeter wavelength over the Golden Gate at San Francisco, California. The purpose of the measurement was to determine the characteristics of the signal reflected from the water surface. Measurements included (1) the total signal, (2) the signal with the direct component nulled out, and (3) the signal with a broad null on the specular reflection. These were all measured for one way transmission for simultaneous reception at two receiving antennas separated vertically 50 and 100 wavelengths. In addition, a wave gage recorded the water waves. Analysis of this data has included (1) determining the amplitude distributions, (2) the cross correlation functions, (3) the auto correlation functions, (4) the power spectra. The resulting data is compared to the results expected from the sea reflection model suggested by the Applied Physics Laboratory and at least qualitative agreement is found. Measurement techniques were not sufficiently developed to allow complete quantitative comparison. Suggestions are made for a measurement program to give data which will be a more complete test of the sea reflection model. (Author)

AD-631 484 Fld. 20/14, 9/5
CFSTI Prices: HC $6.00 MF $1.25
MOORE SCHOOL OF ELECTRICAL ENGINEERING UNIV OF PENNSYLVANIA PHILADELPHIA
FRESNEL ZONE THEORY.
Interim technical rept.,
by W. R. Lind. Mar 66, 246p. Rept. no. MSR-66-20,
Contract AF 30 (602)-3290, Proj. AF-4540,
Task 454002,
RADC TR-66-66
Unclassified report

Descriptors: (*Antenna radiation patterns, *State-of -the-art reviews), Field theory, Gain, Geophysics, Performance (Engineering), Approximation (Mathematics)

This report is concerned with 'the state of the art' of Fresnel zone thoery. Starting with Maxwell's equations expressions are obtained for fields, power density, and gain in the near field of aperture antennas. The effect of the size, shape, and aperture distribution of a 'probe' which is used to measure antenna parameters in the Fresnel region and power transfer between antennas located in each other's Fresnel region is also discussed. The above quantities are discussed for various aperture distributions and aperture shapes. The effect of obstacles and the ground in the Fresnel region of an antenna on its performance are presented. Various methods, together with their limitations, for measuring Fraunhofer antenna data in the Fresnel region are also discussed. Experimental data have been included whenever available. (Author)

AD-631 486 Fld. 20/14, 9/5
CFSTI Prices: HC $2.60 MF $0.50
HUGHES AIRCRAFT CO CULVER CITY CALIF RESEARCH AND DEVELOPMENT DIV
ON THE PROBLEM OF ANTENNA PATTERN SYNTHESIS AND OPTIMUM APERTURE DISTRIBUTION UNDER CONSTRAINT.
Scientific rept.,
by Thomas S. Fong. Dec 65, 27p. Rept. no. Scientific-6,P66-12
Contract AF 19 (628)-4349, Proj. AF-4600,
AFCRL 66-138
Unclassified report

Descriptors: (*Antenna radiation patterns, Synthesis), Antennas, Antenna apertures, Distribution functions, Functional analysis, Fourier analysis, Radiowaves, Propagation

The antenna pattern synthesis problem for a finite line source is formulated and treated in the space of absolutely square-integrable functions. A close examination is made of the condition that must be imposed on the desired radiation pattern so that the problem is solvable. The optimum aperture distribution is determined by the variational technique, subject to the requirement that the approximating radiation patterns should have a superdirective ratio less than or equal to some fixed positive value. The optimality of the solution is demonstrated by considering the sufficient condition. The error criterion is measured in the mean-square sense. (Author)

AD-631 623 Fld. 20/14
GENERAL ELECTRIC CO LTD WEMBLEY (ENGLAND) CENTRAL RESEARCH LABS
RAINFALL ATTENUATION OF CENTIMETER WAVES: COMPARISON OF THEORY AND MEASUREMENT.
Revised ed.,
by Richard G. Medhurst. 5 Mar 65, 16p.
Unclassified report

Revision of Manuscript received 16 Nov 64.

Availability: Published in IEEE Transactions on Antennas and Propagation vAP-13 n4 p550-64 Jul 1965. Copies to DDC users only.

Descriptors: (*Rainfall, *Radiofrequency interference), (*Microwaves, Attenuation), Electromagnetic waves, Radio waves, Absorption, Scattering, Raindrops, Particle size, Correlation techniques

Numerical results for attenuation of centimeter waves by rainfall have been computed from J. W. Ryde's formula. These correct, and considerably extend, the previously published Ryde results. Comparison with available measurements suggests that the agreement is not entirely satisfactory; there is a tendency for measured attenuations to exceed the maximum possible levels predicted by the theory. (Author)

AD-631 694 Fld. 20/14, 20/9
CFSTI Prices: HC $4.00 MF $1.00
GENERAL DYNAMICS/FORT WORTH TEX
MULTI-FLUID ANALYSIS OF WAVE PROPAGATION IN A MAGNETOPLASMA,
Final rept. 27 Jan-31 Dec 65,
by B. A. Sodek Jr., D. M. Gibson, and G. H. Brigman. 23 Mar 66, 135p. Rept. no. FZM-4609,
Contract AF 49 (638)-1428,
AFOSR 66-0692
Unclassified report

Descriptors: (*Waveguides, *Plasma physics), (*Magnetohydrodynamics, Propagation), Hall effect, Temperature, Plasma sheath, Boundary value problems

A theoretical investigation has been conducted to determine the propagation characteristics of small amplitude, hydromagnetic waves in a magnetoplasma-filled waveguide at signal frequencies approximately equal to or less than the ion-cyclotron frequency. An inviscid, quasi-one-fluid analysis was made which includes the effects of Hall field. A more complex analysis was made which incorporated the effects of unequal electron and ion temperatures, space charge, diffusion, and current inertia. The method of approach was then generalized to permit treatment of neutral particle dynamics. This included partial ionization of the plasma and the existence of a sheath of neutral particles at the walls of the waveguide. A numerical study was also conducted to establish the significance of multi-fluid effects on the phase velocity, attenuation, cutoff frequency (where pertinent), and wave patterns. (Author)

AD-631 411 See Fld. 5/1

AD-631 488 See Fld. 9/5

AD-631 709 See Fld. 20/2*

AD-631 771 See Fld. 14/2

Field 21-PROPULSION AND FUELS

21/2. COMBUSTION AND IGNITION

AD-631 577 Fld. 21/2, 20/13
CFSTI Prices: HC $1.10 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
CONSTRUCTING I-THETA-DIAGRAMS OF COMBUSTION PRODUCTS TAKING INTO ACCOUNT THE DISSOCIATION OF CO2 AND H2O,
by S. A. Tager, and A. S. Smirnov. 23 Mar 66, 5p. Rept. no. FTD-TT-65-1457,
Unclassified report

Trans. of Teploenergetika (USSR) n5 p94 1965.

Descriptors: (*Combustion products, Thermal properties), (*Carbon dioxide, Dissociation), (*Water vapor, Dissociation), Graphics, Temperature, Heat of reaction, USSR

AD-631 638 Fld. 21/2, 14/2
CFSTI Prices: HC $4.60 MF $0.50
ESSO DEVELOPMENT, CO LTD ABINGDON (ENGLAND)
MEASUREMENT OF BURNING VELOCITY A SURVEY-,
by R. M. Fristrom. Apr 63, 50p. Rept. no. TG-481,
Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Burning rate, Measurement), Flames, Flow visualization, Tracer studies, Particles, Pitot tubes, Flame propagation, Photographic analysis, Reviews, Bibliographies

Experimental methods of determining burning velocity are reviewed. Topics include: particle tract method, pitot tube measurements, flame kernel methods, and burner methods of measuring burner velocity. An annotated bibliography of representative works is appended.

AD-631 721 Fld. 21/2, 7/4
CFSTI Prices: HC $3.60 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
IBM 7090 PROGRAM FOR COMPLEX CHEMICAL KINETIC FLOW COMBUSTION,
by S. Favin. Dec 62, 40p. Rept. no. TG-456, Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Combustion, Reaction kinetics), (*Reaction kinetics, Programming (Computers)), Supersonic nozzles, One-dimensional flow, Equations, Chemical reactions, Temperature, Density, Combustion products, Velocity, Pressure, Thermodynamics, Hydrogen, Air

A Fortran computer program was developed for the calculation of the one-dimensional flow of a reacting gas through a supersonic nozzle. The report describes the equations and their use in the program. In its present form it handles five chemical elements and fifteen chemical species undergoing thirty reversible reactions. These limitations are easily expanded. The initial conditions and equations required for the solutions of a specific problem are discussed. A solution produces temperature, density, chemical composition, velocity and pressure versus distance and/or time through the specific nozzle. Available thermodynamic and kinetic data built into the program are supplied. A H2-Air problem is used to illustrate the program. (Author)

AD-631 723 Fld. 21/2
CFSTI Prices: HC $2.60 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
DESIGN OF A LOW-PRESSURE BURNER SYSTEM FOR LAMINAR FLAME STUDIES,
by R. M. Fristrom, and S. D. Raezer. Aug 57, 27p. Rept. no. CM-912, Contract NOrd-7386,
Unclassified report

Descriptors: (*Flames, Test equipment), Low-pressure research, Stability, Gas flow, Photographic analysis, Laminar flow

Design considerations are given for the construction of a burner system for the study of premixed laminar flames at subatmospheric pressures (one-half to one -twentieth atmosphere). The principal requirement of the system is that the flame front must remain accurately fixed in space (plus or minus 30 microns) over prolonged periods of time (10 minutes). To obtain stability of this order, careful regulation of gas flow and pressure in the system is required. This is accomplished by using critical flow gas inlets and a critical flow gas pumping outlet, with the atmosphere itself as the constant pressure source. The system described allows maintenance of constant pressure to within 0.05 per cent. The source of undesirable flame fluctuations and their suppression are also discussed. A diagram and photographs of a successful burner system are given. (Author)

AD-631 786 Fld. 21/2
CFSTI Prices: HC $1.10 MF $0.50
OHIO STATE UNIV COLUMBUS ROCKET RESEARCH LAB
FORMATION OF DETONATION WAVES IN FLOWING COMBUSTIBLE GASEOUS MIXTURES AND LIQUID-SPRAY MIXTURES.
Final rept. 1 Feb 65-31 Jan 66,
by Loren E. Bollinger, and Rudolph Edse. 15 Mar 66, 7p. Rept. no. 1,
Contract AF-AFOSR-203-65, Proj. AF-9711,RF-1976 Task 971101,
AFOSR 66-0695
Unclassified report

Descriptors: (*Detonation waves, Mixtures), (*Sprays, Detonations), (*Gases, Detonations), Liquids, Fluid flow, Shock waves, Fuels, Hydrogen, Oxygen, Methane, Reynolds number, Velocity, Propagation, Combustion

Detonation induction distances were determined in a 9-mm inside diameter detonation tube at an initial pressure of 1 atm at ambient initial temperature for hydrogen-oxygen mixtures flowing at initial velocities ranging from 1-100 meters/second and for methane-oxygen mixtures flowing at velocities ranging from 0-30 meters/second. Some experiments with hydrogen-oxygen mixtures were conducted at 5 atm initial pressure. The results show that the induction distances for hydrogen-oxygen mixtures decrease linearly with the logarithm of the Reynolds number based on the initial linear gas velocity. The induction distance of the detonation wave propagating upstream is shorter than that of the wave propagating downstream. Induction distances in methane-oxygen mixtures were essentially constant over the range of flow velocities employed. Certain observations seem to indicate that higher turbulence levels in the initial gas flow cause an effective decrease in the quenching diameter. (Author)

AD-631 588 **See Fld. 21/8**

AD-631 774 **See Fld. 21/8**

AD-631 787 **See Fld. 7/5**

AD-631 817 **See Fld. 21/5**

21/3. ELECTRIC PROPULSION

AD-631 591 **See Fld. 20/9**

21/4. FUELS

AD-631 653 Fld. 21/4, 21/5
CFSTI Prices: HC $3.00 MF $0.75
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
RAMJET TECHNOLOGY. CHAPTER 6. FUELS.
Technical memo.,
by W. E. Wilson,Jr., and W. G. Berl. Jul 65, 64p. Rept. no. TG-610-6,
Contract NOw-62-0604-c,
Unclassified report

See also AD-630 330.

Descriptors: (*Ramjet engines, Fuels), (*Jet engine fuels, Thermochemistry), Hydrocarbons, Slurry fuels, Metals, Pyrophoric materials, Boranes, Thermodynamics, Tables

This chapter deals primarily with the criteria for selecting a satisfactory fuel. It discusses methods of calculating flame temperatures and specific impulse parameters, and outlines prospects for obtaining fuels with improved performance.

AD-631 702 **See Fld. 13/11**

21/5. JET AND GAS TURBINE ENGINES

AD-631 445 Fld. 21/5, 14/5
CFSTI Prices: HC $1.10 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
HIGH-VELOCITY AIR TURBINE ENGINE,
by S. N. Sidorov, and I. Ya. Vishnyakov. 23 Mar 66, 7p. Rept. no. FTD-TT-65-1737,
Unclassified report

Unedited rough draft trans. of Patent (USSR) 164 885, appl. 827283/26-10, 26 Mar 63.

Descriptors: (*Gas turbines, Patents), (*Motion picture photography, Gas turbines), High-speed photography, Gas turbine nozzles, Design, USSR

The object of the invention is a high-speed air turbine to be used in moving picture technology in the recording and study of rapid processes accompanied by light phenomena measured in intervals of time of the order of 10 to the minus 8th power per second. For the purpose of increasing the speed of the turning of a mirror rotor and raising the power of the turbine, the curvilinear channels of the nozzle device directing the flow of air in a radial direction onto the operating wheel of the turbine are designed as a rectangular section with a narrowing area in the middle part and are disposed in fan fashion. (Author)

AD-631 578 Fld. 21/5, 13/8
CFSTI Prices: HC $1.60 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
MECHANIZATION AND AUTOMATION OF GAS TURBINE ENGINE BLADE MANUFACTURE,
by V. A. Maksimov. 23 Mar 66, 17p. Rept. no. FTD-TT-65-1492, TT 66-61100
Unclassified report

Unedited rough draft trans. of Avtomatizatsiya Protsessov Mashinostroeniya (USSR) v3 p85-90 1963.

Descriptors: (*Gas turbine blades, Manufacturing methods), Gas turbines, Automation, Machining, USSR

Complex mechanization of blade preparation should embrace all stages of industry from the obtainment of billets to the control of ready blades. Adoption of billets without allowances for the processing by feather profile enables rapid solution of problems of mechanization and automation of mechanical machining processes which is very simplified in this case. Completion of the creation of special equipment will enable mechanization of all operations which will eliminate manual labor, still used in individual operations. By further improving the process of manufacturing blades of compressors and turbines, there should appear automation of mechanical processing, the advisability of which was confirmed by the experimental tasks. (Author)

AD-631 642 Fld. 21/5
CFSTI Prices: HC $2.00 MF $0.50
AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C
AIRBREATHING PROPULSION TECHNOLOGY: COMPILATION OF ABSTRACTS.
Rept. no. 2,
by S. Parandjuk. 2 Dec 64, 40p. Rept. no. ATD-U-64-116,
TT 66-61113
Un lassified report

Trans. of Aviatsionnyi Institut, Moscow. Trudy (USSR) n157 102p 1964. Rept. on Survey of Soviet-Bloc Scientific and Technical Literature.

Descriptors: (*Gas turbines, Combustion chambers), (*Aircraft engines, Gas turbines), Abstracts, Propulsion, USSR, Design, Combustion, Operation, Fuels

AD-631 715 Fld. 21/5, 20/4
CFSTI Prices: HC $3.00 MF $0.75
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
RAMJET TECHNOLOGY. SECTION ON FLOW PROCESSES AND ENGINE PERFORMANCE. CHAPTER FOUR. PROPULSION NOZZLES.
Technical memo.,
by I. D. V. Faro. Feb 65, 57p. Rept. no. TG-610-4,
Contract NOw-62-0604-c,
Unclassified report

See also AD-631 653.

Descriptors: (*Ramjet engine nozzles, *Fluid mechanics), (*Exhaust nozzles, Ramjet engine nozzles), (*Nozzle gas flow, Ramjet engine nozzles), Ramjet engines, Nozzles, Configuration, Jet propulsion, Thermodynamics

Contents: Ideal Nozzle Flows, Nozzle Efficiency, Effect of Recombination in Exhaust Gases, Gas-Particle Nozzle Flows, Conical Nozzles, Contoured Nozzles, Skewed Nozzles, Plug Nozzles, Thrust Vector Control, Movable Nozzles, Deflecting Surfaces, Shock-Induced Deflections, Tabulated Ranges of Parameters in Tables Relevant to Duct Flow.

AD-631 817 Fld. 21/5, 21/2
CFSTI Prices: HC $3.00 MF $0.75
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
RAMJET TECHNOLOGY. SECTION ON FLOW PROCESSES AND ENGINE PERFORMANCE. CHAPTER 5. COMBUSTOR FLOW AND ENGINE PERFORMANCE.
Technical memo.,
by F. Bader, and E. A. Bunt. Nov 64, 90p. Rept. no. TG-610-5,
Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Ramjet engines, Performance (Engineering)), Thermodynamics, Gas flow, Ramjet inlets, Combustion chambers, Exhaust nozzles, Thrust, Optimization, Combustion

Some of the 'real gas' corrections necessary to adapt perfect gas theory to high temperature conditions are discussed. Consideration is given to one of the methods relating to the concept of diabetic processes, which by definition are those in which heat is added to the system either from within or across the walls. Thermodynamic aspects of combustor operation are discussed. Basic thermodynamic calculations of a ramjet engine are made. Analytical estimation of the performance of a ramjet engine and the determination of its optimum design cannot readily be accomplished. The flow of air through an engine is set by the parameters of heat addition to the combustion chamber and the exit nozzle throat area, and the equations relating exit and inlet conditions are usually of a complex implicit nature. Accordingly, calculations first relate conditions at the combustion chamber inlet to those at the exit nozzle throat, and diffuser performance characteristics are then used to determine the diffuser inlet conditions which satisfy the requirement that the flow at the diffuser exit match that at the combustion chamber inlet.

AD-631 413 **See Fld. 1/3**

AD-631 653 **See Fld. 21/4**

AD-631 769 **See Fld. 20/4**

21/6. NUCLEAR PROPULSION

AD-631 738 **See Fld. 18/6**

21/8. ROCKET MOTORS AND ENGINES

AD-631 588 Fld. 21/8, 21/2, 21/9
CFSTI Prices: HC $3.00 MF $0.75
AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C
COMBUSTION INSTABILITY IN LIQUID AND SOLID PROPELLANT ROCKETS. COMPREHENSIVE REPORT.
Rept. no. 1 on ATD work assignment no. 88,
by Paul Vantoch. 22 Nov 65, 59p. Rept. no. ATD-65-106,
TT 66-61108
Unclassified report

Based on Soviet open literature covering the period Jan 60-Sep 65. Rept. on Soviet Scientific and Technical Literature.

Descriptors: (*Combustion, Stability), (*Rocket motors (Liquid propellant), Combustion), (*Rocket motors (Solid propellant), Combustion), Performance (Engineering), Thermodynamics, Solid rocket propellants, Liquid rocket propellants, USSR, Reviews

Several theoretically derived criteria for combustion instability are discussed and their limitations for predicting performance characteristics are pointed out. The effect of various factors such as pressure, temperature gradient, temperature sensitivity, and particle size on the burning velocity are reviewed and their significance for instability is outlined. Other potential elements of combustion instability such as the phase transformations and physical-reaction mechanisms are also treated. Some of the instability mechanisms are discussed together with the possibility of modifying them by proper propellant formulation in order to prevent instability. Various factors affecting stability are summarized. Source material directly and indirectly related to the subject is analyzed. Articles on high- and low-frequency instability, theoretical derivation of stability criteria, and experimental investigations of instability are reviewed. Factors influencing instability are summarized and discussed together with suggested measures for suppressing instability. (Author)

AD-631 682 **See Fld. 16/4**

21/8.1 LIQUID ROCKET MOTORS

AD-631 774 Fld. 21/8.1, 21/2
CFSTI Prices: HC $3.60 MF $0.50
SHEFFIELD UNIV (ENGLAND) DEPT OF FUEL TECHNOLOGY AND CHEMICAL ENGINEERING
SOME PROPOSED MECHANISMS FOR CHUGGING, SWOSH, ROTARY SCREECH, AND BOUNDARY LAYER DESTRUCTION IN LIQUID PROPELLANT ROCKET COMBUSTION CHAMBERS.
Technical (scientific) note,
by M. W. Thring, R. Hern, and J. M. Jenkins. Mar 60, 35p. Rept. no. TN-1,
Contract AF 61 (052)-150,
Unclassified report

Descriptors: (*Rocket motors (Liquid propellant), Oscillation), (*Combustion chambers, Acoustic properties), Bipropellants, Combustion, Gas flow, Flow visualization, Liquid jets, Boundary layer, Great Britain

A dynamically scaled model of an element of a bipropellant rocket combustion chamber incorporating a phase change was constructed. Photographic evidence of the flow patterns using particulate tracers in the model has substantiated a theoretical study of liquid jet gas entrainment. It has also indicated a possible driving mechanism for chugging and certain rotary modes of oscillation. The character of these oscillations is deduced to be similar to swosh in the low frequency amplitude limited case and to rotary screech in the high frequency amplitude divergent case. This latter case leads to boundary layer scrubbing with the resultant destruction of the boundary layer. (Author)

AD-631 443 **See Fld. 16/4**

21/8.2 SOLID ROCKET MOTORS

AD-631 640 Fld. 21/8.2
CFSTI Prices: HC $5.60 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
BASIC TVC EXPERIMENTS WITH GAS INJECTION AND PROBES,
by R. E. Walker, A. R. Stone, and M. Shandor. Oct 63, 52p. Rept. no. TG-537,
Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Thrust vector control system, Gas flow), (*Rocket motors (Solid propellant), Exhaust gases), Supersonic flow, Injection, Force (Mechanics), Probes, Drag, Mathematical models, Specific impulse

Data are presented on side forces generated by (1) lateral injection of sonic gas jets and (2) probe immersion into constant area supersonic duct flow (M = 1.9 or 2.9) provided by a rocket motor exhaust. For gas injection studies, a variety of coldinjectants, injectant orifice sizes and 'tailpipe' lengths were studied. Data also are reported for inert and potentially reactive hot gas injection. Side force and probe drag were measured for various 'tailpipe' lengths and probe immersion depths and diameters. A simple analytical model is introduced which is adaptable to probe thrust vector control (TVC).

21/9. ROCKET PROPELLANTS

AD-631 265 **See Fld. 7/4**

AD-631 483 **See Fld. 6/20**

AD-631 588 **See Fld. 21/8**

Field 22-SPACE TECHNOLOGY

22/1. ASTRONAUTICS

AD-631 234 **See Fld. 20/11**

AD-631 293 **See Fld. 22/3**

AD-631 314 **See Fld. 12/2**

AD-631 411 **See Fld. 5/1**

AD-631 429 **See Fld. 5/1**

22/2. SPACECRAFT

AD-631 585 Fld. 22/2
CFSTI Prices: HC $16.40 MF $1.00
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
STATION OUTSIDE THE EARTH,
by B. V. Lyapunov. 27 Jan 66, 168p. Rept. no. FTD-MT-64-531,
TT 66-61106
Unclassified report

Edited machine trans. of mono. Stantsiya vne Zemli, Moscow 1963 p1-147.

Descriptors: (*Satellites (Artificial), USSR), (*Space stations, USSR), (*Spacecraft, USSR), Meteorological satellites, Communication satellites (Active), Communication satellites (Passive), Manned spacecraft, Space flight, Extraterrestrial bases, Rocket propulsion, Interplanetary trajectories

Translation of a 1963 Russian publication on space stations, satellites, interplanetary routes and their value for science and practical use.

AD-631 600 Fld. 22/2
LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF
COMBINED LOADS MINIMUM WEIGHT ANALYSIS OF STIFFENED PLATES AND SHELLS.
Revised ed.,
by A. Bruce Burns, and Jorgen Skogh. 5 Apr 65, 6p. Contract NOw-63-0050,
Unclassified report

Revision of manuscript submitted 19 Oct 64.

Availability: Published in Journal of Spacecraft and Rockets v3 n2 p235-40 Feb 1966. Copies to DDC users only.

Descriptors: (*Sandwich construction, Weight), Loading (Mechanics), Stiffened cylinders, Aerospace craft

Existing principles and concepts useful for combined loads minimum weight analysis are reviewed and applied to two stiffened structures: a truss-core sandwich flat plate subjected to combined edgewise compression and in-plane shear, and a truss-core sandwich cylinder subjected to combined uniform axial compression and uniform external lateral pressure. The results obtained in terms of load ratios and the minimum weight parameters characteristic of stiffened structures subjected to singly applied loads, show the variation in efficiency and minimum weight geometric proportions as the load ratio progresses from one extreme to the other. Limitations in the work principally relate to the lack of experimentally verified interaction equations applicable to minimum weight, stiffened structures.

AD-631 643 Fld. 22/2, 9/5, 20/11
CFSTI Prices: HC $4.60 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
BENDING IN AN EXTENDIBLE BOOM SUBJECT TO THE INFLUENCE OF A GRAVITATIONAL-CENTRIFUGAL FORCE FIELD,
by James F. Smola. Nov 63, 43p. Rept. no. TG-522A,
Contract NOw-62-0604-c,
Unclassified report

This report supersedes TG-522, same title, dated September 1963.

Descriptors: (*Antenna masts, Bending), (*Satellite antennas, Antenna masts), (*Satellites (Artificial), Stabilization systems), Gravity, Force (Mechanics), Centrifugal fields, Extendable structures, Radio astronomy, Booms, Mathematical analysis

The analysis was undertaken to determine the magnitude of bending that can be expected in extremely long extendible booms such as those employed in gravity -gradient stabilization systems or as low-frequency antennas aboard earth-oriented satellites. It is simple enough to demonstrate that boom bending will occur due to the imbalance of gravitational and centrifugal forces on particles of an orbiting body not at the center of mass. This bending is demonstrated for a specific configuration. (Author)

AD-631 713 Fld. 22/2, 20/11, 9/5
CFSTI Prices: HC $2.00 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
BENDING IN AN EXTENDIBLE BOOM SUBJECT TO THE INFLUENCE OF A GRAVITATIONAL - CENTRIFUGAL FORCE FIELD,
by James F. Smola. Sep 63, 32p. Rept. no. TG-522,
Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Antenna masts, Bending), (*Satellite antennas, Bending), Booms, Extendable structures, Radio astronomy, Antenna radiation patterns, Degradation, Satellites (Artificial), Stability, Gravity, Centrifugal fields, Stabilization systems

The study demonstrates that boom bending due to the influence of a centrifugal-gravitational force field cannot be ignored or underestimated if the boom is to serve as a fairly stable radio-frequency antenna. The fact that any bending whatever will effect the antenna pattern, dictates that certain steps be taken to minimize it. This can be implemented by maximizing the boom's flexural rigidity.

AD-631 828 Fld. 22/2, 20/11, 9/5
CFSTI Prices: HC $2.00 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
THE EFFECT OF CONICAL CONFIGURATION ON EXTENDIBLE BOOM CHARACTERISTICS IN A GRAVITATIONAL-CENTRIFUGAL FORCE FIELD,
by James F. Smola. Feb 64, 49p. Rept. no. TG-554,
Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Antenna masts, Bending), (*Satellite antennas, Bending), (*Conical bodies, Booms), Extendable structures, Radio astronomy, Gravity, Centrifugal fields, Satellites (Artificial), Loading (Mechanics), Solar radiation, Configuration, Deflection

At the expense of fabrication ease, it appears that substantial weight savings and reductions in boom tip deflection can be obtained by resorting to configurations comprised of geometries more suitable than a circular cylinder. Cones with a uniform wall and a uniformly decreasing wall are but two of many selections possible. Weight reductions on the order of 50 per cent and 66 2/3 per cent respectively, with corresponding reductions in tip deflections of 40 per cent and 73 per cent, are obtainable by employing these two approaches (or their equivalents, if the fabrication problem of these precise configurations proves to be insurmountable). Thermal deflection studies indicate that the cone with a uniformly decreasing wall thickness is superior to the other geometries studied. Fortunately, the same holds true for this same configuration in the presence of a gravitational-centrifugal force field. (Author)

AD-631 268 See Fld. 9/6

AD-631 273 See Fld. 4/1

AD-631 276 See Fld. 9/6

AD-631 339 See Fld. 20/9

AD-631 357 See Fld. 20/13

AD-631 358 See Fld. 13/1

AD-631 359 See Fld. 13/1

AD-631 399 See Fld. 13/1

AD-631 406 See Fld. 13/13

AD-631 470 See Fld. 4/1

AD-631 497 See Fld. 9/2

AD-631 509 See Fld. 4/2

AD-631 645 See Fld. 9/6

AD-631 700 See Fld. 10/3

AD-631 707 See Fld. 8/6

AD-631 710 See Fld. 20/13

AD-631 822 See Fld. 9/5

AD-631 825 See Fld. 14/2

22/3. SPACECRAFT TRAJECTORIES AND REENTRY

AD-631 293 Fld. 22/3, 22/1, 1/1
CFSTI Prices: HC $7.00 MF $1.75
AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C
SPACECRAFT UTILIZING THE LIFTING REENTRY TECHNIQUE. PART II. REVIEW OF THEORETICAL STUDIES IN LIFTING REENTRY.
Sect. I, Comprehensive rept., Sect. II, Annotated Bibliography,
by Victor Klein, Alexis Baratoff, and Ivan M. Soukhanov. 1 Apr 66, 383p. Rept. no. ATD-66-34-Pt-2,
TT 66-61052
Unclassified report

Based on Communist World open technical literature, 1 Jan 57-31 Dec 64.

Descriptors: (*Atmosphere entry, *Lift), (*Aerodynamics, Atmosphere entry), (*Spacecraft, Atmosphere entry), Bibliographies, Astronautics, Aeronautics, Aerospace craft, Aerodynamic heating, Thermal stresses, Shock waves, Ablation, Heat shields, Meteorites, Hazards, USSR

This report (comprehensive report with annotated bibliography) is based on Soviet-Satellite open sources published 1957-1964, although some earlier articles are included. Section I is a comprehensive review of sources on theoretical and experimental studies of problems in fields of space sciences, i.e., problems of lifting and ballistic hypervelocity flight, and atmospheric reentry techniques. There are four parts following the Introduction: Group A. High-speed aerodynamics and gas dynamics; Group B. High-speed aerothermodynamics; Group C. High-speed flight mechanics; Group D. Strength of flight -vehicle components (thin and sandwich plates and shells). A brief conclusion is given. In writing this report articles and monographs having a closer relation to the reentry problem and showing either an original approach to the problem or a new method applied to its solution were selected from the bibliography and used. Section II is an annotated bibliography containing 861 entries arranged by subject in a manner similar to Section I: Group A. Aeromechanics of high-speed flows (451 entries); Group B. Aerothermodynamics of high-speed flows (168 entries); Group C. Flight mechanics (53 entries); Group D. Strength of space vehicle components (175 entries); Group E. Miscellaneous (14 entries). (Translator)

AD-631 446 Fld. 22/3, 17/2
CFSTI Prices: HC $1.10 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
DETERMINING COORDINATES OF FAR OFF SATELLITES WITH THE AID OF A TELEVISION SYSTEM,
by E. S. Agapov, and V. F. Anisimov. 23 Mar 66, 6p. Rept. no. FTD-TT-65-1679,
Unclassified report

Unedited rough draft trans. of mono. Opyt Opredeleniya Koordinat Dalekikh Sputnikov s Pomoshchyu Televizionnoi Sistemy, 1965 3p.

Descriptors: (*Television equipment, Tracking), (*Satellite tracking systems, Television equipment), USSR

AD-631 566 Fld. 22/3, 3/3
CFSTI Prices: HC $1.60 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
THE ROTATIONAL MOTION OF AN ARTIFICIAL SATELLITE ON ELLIPTICAL ORBIT,
by M. S. Volkov. 30 Mar 66, 17p. Rept. no. FTD-TT-65-1557,
TT 66-61095
Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Institut Teoreticheskoi Astronomii. Byulleten', v9 n4 p274-82 1963.

Descriptors: (*Satellites (Artificial), Rotation), Elliptical orbit trajectories, Differential equations, Integration, Moment of inertia, Celestial mechanics

The paper deals with the integration of differential equations of rotational motion of an artificial satellite on elliptical orbit. The solution has been constructed in the form of the series of sigma = 3/4-n/L times A-C/A, where n - the mean motion of the satellite on the orbit, L - precessional rotation velocity of the satellite, A, C - moments of inertia of the satellite with dynamical symmetry. (Author)

AD-631 590 Fld. 22/3
CFSTI Prices: HC $8.60 MF $0.75
AIR FORCE FLIGHT DYNAMICS LAB WRIGHT-PATTERSON AFB OHIO
A CLOSED-FORM SOLUTION TO LIFTING REENTRY.
Technical rept., Aug 64-Mar 65,
by Roland N. Bell. Dec 65, 72p. Rept. no. AFFDL-TR-65-65,
Proj. 1366, Task 136602,
Unclassified report

Descriptors: (*Lift, Atmosphere entry), (*Reentry vehicles, Lift), Mathematical prediction, Roll, Pitch (Motion), Maneuverability

This report derives closed-form expressions for predicting the longitudinal and lateral range attainable by lifting reentry vehicles. The resultant equations sensitively and accurately define the influence of L/D ratio, bank angle and entry velocity variations over a spectrum of values. To illustrate the usefulness of the method, the derived expressions were used to conduct a parametric reentry study covering a range of L/D ratios from 0.5 to 4.0, bank angles from 0 to 75 degrees and entry velocities from 0.89V sub c to 0.99V sub c. The results of this study are compared with those obtained from a high speed computer study using the same range of reentry conditions. As an aid to future investigators, a series of curves is presented giving longitudinal and lateral range values for various selected L/D, bank angle and entry velocity values. For those wishing to investigate reentry under conditions not covered by these curves, a detailed 'recipe' for utilizing the method is included in an appendix. A comparison of the results of this method with those of more rigorous methods for the same reentry conditions shows that the closed-form solution has sufficient accuracy and sensitivity to be of considerable value to those persons requiring a rapid, preliminary estimate of vehicle performance. (Author)

AD-631 604 Fld. 22/3
LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF
EARTH-DEPARTURE PLANE CHANGE AND LAUNCH WINDOW CONSIDERATIONS FOR INTERPLANETARY MISSIONS.
Revised ed.,
by J. M. Deerwester, J. F. McLaughlin, and J. F. Wolfe. 22 Jul 64, 6p. Contract NAS8-5024, NAS8-5020
Unclassified report

Revision of manuscript submitted 31 Mar 65.

Availability: Published in Journal of Spacecraft and Rockets v3 n2 p171-4 66. Copies to DDC users only.

Descriptors: (*Interplanetary trajectories, *Parking orbit trajectories), Launching

An analysis of the trajectory constraints imposed on interplanetary mission launches from an established parking orbit plane is presented. Three major Earth-escape modes are defined and compared with respect to energy and plane-change requirements. A single equation is developed which determines the plane-change requirement for any mission in terms of the parameters that cause it. Example interplanetary missions to Venus and Mars are used to illustrate the resulting decrease in launching opportunity resulting from plane-change considerations. (Author)

AD-631 650 Fld. 22/3, 17/9
CFSTI Prices: HC $1.60 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
RAPID DETERMINATION OF SATELLITE ORBITS FROM DOPPLER DATA,
by Robert R. Newton. Mar 63, 22p. Rept. no. TG-477,
Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Orbital trajectories, Determination), (*Tracking, Doppler systems), Experimental data, Least squares method

In the orbit determination procedure described in this paper, the set of physical quantities fitted in the computations is not the set of basic measurements made by the ground stations. Rather, it uses the basic measurements on a pass-by-pass basis, together with a preliminary estimate of the orbit, to determine a fictitious position of the tracking station for each pass. It can be shown that the error in station position is also a representation of the error in satellite position at the center time of the pass. Thus, for each pass, a new estimate of satellite position is formed, and a new orbit is chosen to fit these positions. It should be possible to apply this method to any type of tracking data. With Doppler data, the convergence of the orbit determination position is much faster than that of the conventional method. (Author)

AD-631 652 Fld. 22/3, 12/1
CFSTI Prices: HC $2.00 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
SOME SPECIAL PROBLEMS IN STATISTICAL INFERENCE ASSOCIATED WITH SATELLITE TRACKING,
by William H. Guier. May 63, 26p. Rept. no. TG-496,
Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Decision theory, *Tracking), Satellites (Artificial), Doppler systems, Geodesics

Satellite tracking systems (notably optical and doppler) have been developed to such a degree that the accuracy of orbit determination is no longer limited by the accuracy of the tracking data itself but is almost wholly limited by other parameters associated with the satellite motion and tracking system. The principal parameters limiting this accuracy are those associated with the earth's gravitiation force field and the locations of the satellite tracking stations. Significant improvement in the values of a few of these parameters has already been made via studies of satellite motion but, in most cases, they have been made without the use of statistical inference techniques. The Navy's doppler tracking system provides ample high quality data for statistically inferring very accurate values of these parameters. However, employing inference techniques to tracking data obtained from such a system gives rise to some unusual problems. In particular the validity of inference techniques depends very strongly on correctly estimating the character of and correlations in the experimental tracking data. This paper will discuss briefly some of the more difficult problems associated with specifying the errors in the data, the consequent problems in determining optimum statistical weighting factors, and finally the difficulties in realistically estimating the probable errors in the inferred values for the parameters. (Author)

AD-631 664 Fld. 22/3
CFSTI Prices: HC $1.00 MF $0.50
TRAINING CENTER FOR EXPERIMENTAL AERODYNAMICS RHODE-SAINT-GENESE (BELGIUM)
OPTIMIZATION OF RECOVERY TRAJECTORIES FOR SPACE VEHICLES.
Annual summary rept. 1 Oct 62-30 Sep 63,
by L. Moulin. 30 Sep 63, 10p. Contract AF-EOAR-39-63,
Unclassified report

Descriptors: (*Optimization, *Atmosphere entry), (*Spacecraft, Recovery), Space propulsion, Descent trajectories

The status of work in the following areas is reported (1) high acceleration propulsion (2) low acceleration propulsion (3) overall payload optimization and (4) analysis of the trajectories into the atmosphere.

AD-631 724 Fld. 22/3
CFSTI Prices: HC $1.00 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
DETERMINATION OF THE ODD ZONAL HARMONICS FROM THE MOTION OF FOUR SATELLITES,
by Robert R. Newton, and William H. Guier. Aug 63, 12p. Rept. no. TG-519-109,
Contract NOw-62-0604-c,
Unclassified report

See also AD-602 055.

Descriptors: (*Satellites (Artificial), Orbital trajectories), (*Harmonic analysis, Orbital trajectories), Potential theory, Perturbation theory, Geophysics, Tracking, Doppler systems

AD-631 804 Fld. 22/3, 12/1
CFSTI Prices: HC $5.00 MF $1.00
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
THE STATISTICAL INFERENCE OF PARAMETERS FROM SATELLITE TRACKING DATA,
by William H. Guier. Jan 64, 190p. Rept. no. TG-548,
Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Tracking, Satellites (Artificial)), (*Decision theory, Tracking), Doppler systems, Data, Statistical analysis

AD-631 824 Fld. 22/3
CFSTI Prices: HC $1.00 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
ERRORS IN LONG-TERM ORBITAL PREDICTION,
by Robert R. Newton. Feb 64, 20p. Rept. no. TG-555,
Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Orbital trajectories, Mathematical prediction), (*Satellites (Artificial), Orbital trajectories), Errors, Satellite tracking systems, Doppler effect, Geodesics

The results of orbital prediction over periods from two to six months are presented. The orbits used in the predictions were based upon Doppler data obtained within not more than twenty-four hours. After removing the drag contribution, the remaining prediction error is found to grow linearly with time, contrary to the theory of Moe (1963). An alternate expression for the growth of error is given. It is shown that the contribution from measurement error is an order of magnitude below the contribution from geodetic errors. (Author)

AD-631 826 Fld. 22/3
CFSTI Prices: HC $1.00 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
KEPLER PARAMETERS FOR THE ORBITS OF SATELLITES 1960 GAMMA2 AND 1960 ETAL.
Mar 64, 17p. Rept. no. TG-561,
Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Celestial mechanics, *Orbital trajectories), Satellites (Artificial), Tracking, Data, Tables

AD-631 212 See Fld. 8/5

AD-631 356 See Fld. 20/13

AD-631 438 See Fld. 17/8

AD-631 444 See Fld. 8/5

AD-631 451 See Fld. 17/8

AD-631 802 See Fld. 17/3

22/4. SPACECRAFT LAUNCH VEHICLES AND GROUND SUPPORT

AD-631 722 Fld. 22/4
CFSTI Prices: HC $2.60 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
DESIGN CONSIDERATIONS OF A VERSATILE SEMI-AUTOMATIC SATELLITE TESTER,
by Edward L. Marshall. 16 Nov 62, 27p. Rept. no. CF-3008A,
Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Test sets, *Satellites (Artificial)), (*Checkout equipment, Satellites (Artificial)), Automation, Data processing systems, Digital systems

In order to improve the accuracy and to expedite the testing processes, a commercially available automatic data logging system was incorporated into a new satellite system tester. The data logging system selected was comprised of a digital voltmeter, 100 channel circuit scanner, and a paper tape data printer. This unit together with patch boards, switches, power supplies, battery chargers, etc., is combined into a versatile satellite tester. The new test set has distinct advantages over previous units in that: It has improved accuracy due to the 0.1 percent (or better) resolution of the digital voltmeter. A higher data accumulation rate is afforded by the automatic scanner and printer. Ease of modification is enhanced through the use of 'patch board' wiring techniques. The test set is designed so that it can later be modified for use with other satellites. (Author)

How To Use Indexes To TAB Portion Of

U. S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS

SUBJECT INDEX

The Subject Index is arranged alphabetically by asterisked descriptors from the document announcements in the TAB. Each announcement contains one or more asterisked descriptors which identify the main subjects of the report. The asterisked descriptor may or may not have a modifying descriptor appearing directly below the asterisked descriptor. Under each descriptor entry in the Subject Index appear the following items of information: annotation, AD number, and field/group. A typical subject index entry is shown below.

*ALUMINUM
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METAL COMPOSITE MATERIALS
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The Personal Author Index is arranged alphabetically by the last names of the authors of reports. When several report entries are given for one author, the entries are arranged numerically by AD number. Field/group and titles are also listed. Three asterisks serve as a separator between entries for reports under the same author. A typical personal author entry is shown below.

*CHASE, JOHN W.
* * *
THE LANTHANUM, EUROPIUM,
AND DYSPROSIUM CONTENTS OF
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AD-619 828 FLD. 8/7
* * *
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The Corporate Author-Monitoring Agency Index is arranged alphabetically by corporate authors and monitoring agencies.

In the corporate author entry for each document are listed the originator of the report, the originator's report number, the title, AD number, and field/group. If the source has listed a monitoring agency in the report, the monitor acronym and monitor series number are given in parenthesis directly under the title. An IDEP (Interservice Data Exchange Program) report number is presented in the same way. A typical corporate author entry is shown on the next page.

*AEROJET- GENERAL CORP AZUSA
CALIF

* * *

TR3015
STUDY OF THE REACTION
OF PENTABORANE WITH HYDRAZINE
AND SUBSTITUTED HYDRAZINES
(AFOSR 65-1058)
AD-619 513 FLD. 7/4

The three asterisks serve as a separator between entries for reports under the same corporate author.

When a report lists a monitoring agency, a corresponding entry is provided under the name of the monitoring agency, which appears in alphabetical order among the corporate author entries. In a monitoring agency entry, the report number is given above the title in place of the originator's report number. A typical monitoring agency entry is shown below.

*AIR FORCE OFFICE OF SCIENTIFIC
RESEARCH WASHINGTON D C

* * *

65-1058
STUDY OF THE REACTION
OF PENTABORANE WITH HYDRAZINE
AND SUBSTITUTED HYDRAZINES
AD-619 513 FLD. 7/4

CONTRACT INDEX

The Contract index is arranged alphanumerically by contract number. Within a contract grouping, each entry contains corporate author, series number (if any), monitor number (if any), AD number, and field/group.

When there are multiple document entries under one contract number, entries are arranged by AD number under each corporate author represented.

A contract entry may also contain a letter F, A, or S on the left-hand margin, indicating that the document is a Final, Annual, or Summary report. A typical contract entry is shown below.

*AF19 628 5167
LINCOLN LAB MASS INST OF TECH
LEXINGTON
(ESD TDR-65-315)
AD-619 580 FLD. 9/5
(ESD TDR-65-309)
AD-619 708 FLD. 3/1

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DPS-1677	
AD-469 558	FLD. 19/1A

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ECOM-03742-6
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AERDL-T-1831-66
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AERDL-T-1832-66
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AERDL-T-1838-66
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*ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER WASHINGTON D C

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•ARMY TRANSPORTATION RESEARCH COMMAND FORT EUSTIS VA

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•ARMY WEAPONS COMMAND ROCK ISLAND ILL RESEARCH AND ENGINEERING DIV

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•AVIATION SAFETY ENGINEERING AND RESEARCH PHOENIX ARIZ

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•BALLISTIC RESEARCH LABS ABERDEEN PROVING GROUND MD

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•BALLISTIC SYSTEMS DIV NORTON AFB CALIF

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•BATTELLE MEMORIAL INST COLUMBUS OHIO

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•BERGEN RESEARCH ENGINEERING CORP TETERBORO N J

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•BOEING CO SEATTLE WASH

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•BOEING SCIENTIFIC RESEARCH LABS SEATTLE WASH GEO-ASTRO PHYSICS LAB

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•BOSTON UNIV MASS HYPOTHERMIA LAB

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•BUREAU OF YARDS AND DOCKS WASHINGTON D C

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•CALIFORNIA INST OF TECH PASADENA SEISMOLOGICAL LAB

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•CALIFORNIA UNIV BERKELEY COLL OF ENGINEERING

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•CARNEGIE INST OF TECH PITTSBURGH PA

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•CARNEGIE INST OF TECH PITTSBURGH PA DEPT OF ELECTRICAL ENGINEERING

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PREPARATION OF GE/SI AND GE/GAAS HETEROJUNCTIONS.
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WESTON INSTRUMENTS INC NEWARK N J
(AMRL-TR-65-166)
F AD-631 465 FLD. 9/3

•AF 33(615)-1908
HUGHES AIRCRAFT CO CULVER CITY CALIF
(AMRL-TR-65-209)
F AD-631 457 FLD. 6/19

•AF 33(615)-1915
OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS
(ARL-66-0008)
AD-631 451 FLD. 17/8

•AF 33(615)-2348
DAYTON UNIV OHIO RESEARCH INST
(AMRL-TR-65-207)
F AD-631 319 FLD. 20/6

•AF 33(657)-8802
MICHIGAN UNIV ANN ARBOR ACOUSTICS AND SEISMICS LAB
05478-6-F
(AFAPL-TR-65-55-VOL-2)
AD-631 628 FLD. 20/1

•AF 33(657)-8951
OHIO STATE UNIV COLUMBUS AERONAUTICAL AND ASTRONAUTICAL RESEARCH LABS
TR-5
(ARL-66-0011)
AD-631 468 FLD. 14/2

•AF 33(657)-10058
RENSSELAER POLYTECHNIC INST TROY N Y DEPT OF MECHANICS
(AFML-TDR-64-97)
AD-631 342 FLD. 14/2

•AF 33(657)-10239
CINCINNATI UNIV OHIO
(AMRL-TR-65-222)
F AD-631 414 FLD. 5/9

•AF 33(657)-10755
BOSTON UNIV MASS HYPOTHERMIA LAB
(AMRL-TR-65-182)
F AD-631 440 FLD. 6/5

•AF 33(657)-10763
OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS HUMAN PERFORMANCE CENTER
(AMRL-TR-65-233)
F AD-631 781 FLD. 15/7

•AF 33(657)-11109
FAIRCHILD SPACE AND DEFENSE SYSTEMS SYOSSET N Y BASIC RESEARCH LABS
AD-631 622 FLD. 14/5

•AF 33(657)-11551
SAINT LOUIS UNIV MO DEPT OF PHYSIOLOGY
(AMRL-TR-66-3)
F AD-631 675 FLD. 6/16

•AF 33(657)-11735
LITTLE (ARTHUR D) INC CAMBRIDGE MASS
65636-2
(ARL-66-0004)
F AD-631 469 FLD. 20/9

•AF 33(657)-13919
TELEDYNE INDUSTRIES INC ALEXANDRIA VA EARTH SCIENCES DIV
SDL-144
AD-631 340 FLD. 8/11

•AF 40(600)-1200
ARNOLD ENGINEERING DEVELOPMENT CENTER ARNOLD AIR FORCE STATION TENN
AEDC-TR-66-43
AD-631 504 FLD. 20/9
AEDC-TR-65-268
AD-631 591 FLD. 20/9

•AF 41(609)-2676
SOUTHWEST RESEARCH INST SAN ANTONIO TEX DEPT OF PHYSICAL AND BIOLOGICAL SCIENCES
F AD-631 232 FLD. 6/18

•AF 41(609)-2679
NORTHROP SPACE LABS HAWTHORNE CALIF
(SAM-TR-66-13)
AD-631 206 FLD. 6/18

•AF 49(638)-1067
JOHNS HOPKINS UNIV BALTIMORE MD
(AFOSR-66-0336)
AD-631 388 FLD. 11/6

•AF 49(638)-1132
WARNER AND SWASEY CO FLUSHING N Y
(AFOSR-66-0352)
AD-631 616 FLD. 20/13

•AF-49(638)-1259
COLUMBIA UNIV NEW YORK
(AFOSR-66-0396)
AD-631 379 FLD. 20/9
COLUMBIA UNIV NEW YORK PLASMA LAB
23
AD-631 372 FLD. 20/9

•AF 49(638)-1257
INDIANA UNIV BLOOMINGTON DEPT OF CHEMISTRY
(AFOSR-66-0596)
F AD-631 787 FLD. 7/5

•AF 49(638)-1271
PRINCETON UNIV N J GAS DYNAMICS LAB
754
(ARL-66-0006)
AD-631 479 FLD. 20/4
726
(ARL-66-0007)
AD-631 598 FLD. 20/4
746
AD-631 727 FLD. 20/4

•AF 49(638)-1276
STANFORD UNIV CALIF DEPT OF AERONAUTICS AND ASTRONAUTICS
SUDAAR-256
(AFOSR-66-0155)
AD-631 508 FLD. 20/11

•AF 49(638)-1280
STANFORD UNIV CALIF DEPT OF AERONAUTICS AND ASTRONAUTICS
(AFOSR-66-0620)
AD-631 393 FLD. 20/4

•AF 49(638)-1290
POLYTECHNIC INST OF BROOKLYN N Y DEPT OF MECHANICAL ENGINEERING
(AFOSR-66-0971)
AD-631 389 FLD. 20/11

•AF 49(638)-1337
CALIFORNIA INST OF TECH PASADENA SEISMOLOGICAL LAB
AD-631 618 FLD. 8/11

•AF 49(638)-1339
STANFORD UNIV CALIF DEPT OF MATHEMATICS
(AFOSR-66-0249)
AD-631 395 FLD. 12/1

•AF 49(638)-1428
GENERAL DYNAMICS/FORT WORTH TEX
FZM-4609
(AFOSR-66-0692)
F AD-631 694 FLD. 20/14

•AF 49(638)-1457
ROCKET POWER INC PASADENA CALIF
(AFOSR-0703)
F AD-631 677 FLD. 7/4

•AF 49(638)-1469
MITHRAS INC CAMBRIDGE MASS
MC-63-96-R2
(AFOSR-66-0701)
F AD-631 676 FLD. 20/6

•AF 49(638)-1502
SOUTHWEST RESEARCH INST SAN ANTONIO TEX DEPT OF INSTRUMENTATION RESEARCH
15-1688-1
(AFOSR-66-0648)
AD-631 679 FLD. 14/2

•AF 49(638)-1647
ELECTROCHEMICAL SOCIETY INC NEW YORK
(AFOSR-66-0638)
AD-631 316 FLD. 7/4

•AF 49(638)-1700
RAND CORP SANTA MONICA CALIF
RM-4991-PR
AD-631 311 FLD. 12/2
RM-4893-PR
AD-631 773 FLD. 20/11

•AF 61(052)-75
AERONAUTICAL RESEARCH INST OF SWEDEN STOCKHOLM
(AFOSR-3938)
AD-631 599 FLD. 20/4

•AF 61(052)-112
GOETTINGEN UNIV (WEST GERMANY) PHYSIKALISCHES INSTITUT
F AD-631 354 FLD. 20/4
AD-631 355 FLD. 20/4

•AF 61(052)-150
SHEFFIELD UNIV (ENGLAND) DEPT OF FUEL TECHNOLOGY AND CHEMICAL ENGINEERING
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AD-631 774 FLD. 21/8.1

•AF 61(052)-210
UNIVERSITAET DES SAARLANDES SAARBRUECKEN (WEST GERMANY)
A AD-631 352 FLD. 13/9
UNIVERSITAET DES SAARLANDES SAARBRUECKEN (WEST GERMANY) MATHEMATISCHES INSTITUT
F AD-631 353 FLD. 13/9

•AF 61(052)-303
TECHNISCHE HOCHSCHULE AACHEN (WEST GERMANY) INSTITUT FUER MECHANIK
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(ARL-142)
AD-631 750 FLD. 20/4

•AF 61(052)-338
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•AF 61(052)-389
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•AF 61(052)-931
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•AF 61(052)-939
NATIONAL AERO- AND ASTRONAUTICAL RESEARCH INST AMSTERDAM (NETHERLANDS)
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•AF 61(052)-511
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F AD-631 565 FLD. 20/4

•AF 61(052)-576
TECHNION - ISRAEL INST OF TECH HAIFA
AD-631 775 FLD. 14/2
TECHNION - ISRAEL INST OF TECH HAIFA DEPT OF AERONAUTICAL ENGINEERING
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•AF 61(052)-640
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AD-631 634 FLD. 6/4

•AF 61(052)-645
TECHNISCHE HOCHSCHULE VIENNA (AUSTRIA)
(AFOSR-66-0202)
AD-631 392 FLD. 20/11

•AF 61(052)-653
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F AD-631 754 FLD. 20/4

•AF 61(052)-666
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•AF 61(052)-681
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F AD-631 777 FLD. 1/3

•AF 61(052)-701
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•AF 61(052)-805
TECHNISCHE HOCHSCHULE AACHEN (WEST GERMANY)
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•AF 61(514)-922
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F AD-631 397 FLD. 1/3

•AF 61(514)-825
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•AF-AFOSR-17-65
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•AF-AFOSR-24-65
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•AF-AFOSR-33-64
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•AF-AFOSR-35-65
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(AFOSR-66-0219)
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•AF-AFOSR-61-47
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•AF-AFOSR-62-136
CHICAGO UNIV ILL
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•AF-AFOSR-62-270
TEXAS UNIV AUSTIN
(AFOSR-5922)
AD-631 243 FLD. 20/10

•AF-AFOSR-83-65
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(ARL-66-0018)
AD-631 601 FLD. 3/2

•AF-AFOSR-89-63
ARIZONA UNIV TUCSON ENGINEERING EXPERIMENT STATION
EES-SERIES-5
(AFOSR-65-2313)
AD-631 635 FLD. 9/2

•AF-AFOSR-141-65
MARYLAND UNIV COLLEGE PARK INST FOR FLUID DYNAMICS AND APPLIED MATHEMATICS
BN-419
(AROD-407:69)
AD-631 808 FLD. 20/4

•AF-AFOSR-144-63
UTAH UNIV SALT LAKE CITY
(AFOSR-66-0010)
AD-631 629 FLD. 5/9

•AF-AFOSR-158-63
BRITISH COLUMBIA UNIV VANCOUVER DEPT OF CHEMISTRY
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•AF-AFOSR-203-65
OHIO STATE UNIV COLUMBUS ROCKET RESEARCH LAB
1
(AFOSR-66-0695)
F AD-631 786 FLD. 21/2

•AF-AFOSR-712-65
CHICAGO UNIV ILL
(AFOSR-66-0193)
AD-631 381 FLD. 20/4

•AF-AFOSR-754-65
MICHIGAN UNIV ANN ARBOR DEPT OF MATHEMATICS
(AFOSR-66-0199)
AD-631 380 FLD. 12/1

•AF-AFOSR-856-65
STANFORD UNIV CALIF INST FOR MATHEMATICAL STUDIES IN THE SOCIAL SCIENCES
(AFOSR-66-0419)
AD-631 779 FLD. 5/7

•AF-AFOSR-883-65
MINNESOTA UNIV MINNEAPOLIS
(AFOSR-66-0214)
AD-631 376 FLD. 12/1
(AFOSR-66-0216)
AD-631 377 FLD. 12/1
(AFOSR-66-0215)
AD-631 378 FLD. 12/1
(AFOSR-66-0263)
AD-631 621 FLD. 12/1

•AF AFOSR-903-65
SOUTHWEST CENTER FOR ADVANCED STUDIES DALLAS TEX
(AFOSR-66-0479)
AD-631 375 FLD. 20/10

•AF-AFOSR-931-65
ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB
R-284
AD-631 691 FLD. 9/5

•AF-EOAR-39-63
TRAINING CENTER FOR EXPERIMENTAL AERODYNAMICS RHODE-SAINT-GENESE (BELGIUM)
A AD-631 664 FLD. 22/3

•AF-EOAR-91-63
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A AD-631 665 FLD. 14/2

•AF-EOAR-61-9
UNIVERSITY COLL CORK (EIRE)
AD-631 770 FLD. 20/11

•AF-EOAR-61-6
BIRMINGHAM UNIV (ENGLAND) DEPT OF INDUSTRIAL METALLURGY
F AD-631 907 FLD. 13/8

•AF-EOAR-62-107
LOUVAIN UNIV (BELGIUM) INSTITUT DE MECANIQUE APPLIQUEE
(AFOSR-64-1496)
F AD-631 627 FLD. 20/11

•AF-EOAR-97-63
PISA UNIV (ITALY) INST OF

AERONAUTICS
F AD-631 956 FLD. 20/4

•ARPA ORDER-193-65
GEOLOGICAL SURVEY DENVER COLO
CRUSTAL STUDIES-49
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•ARPA ORDER-306-64
MICROWAVE LAB STANFORD UNIV CALIF
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•ARPA ORDER-462
FRANKLIN INST RESEARCH LABS
PHILADELPHIA PA CHEMISTRY DIV
B2130-T-9
(AROD-4168:9)
AD-631 698 FLD. 20/12

•ARPA ORDER-512
LINCOLN LAB MASS INST OF TECH
LEXINGTON
TN-1966-16
(ESD-TDR-66-47)
AD-631 285 FLD. 8/11

•ARPA ORDER-600
LINCOLN LAB MASS INST OF TECH
LEXINGTON
(ESD-TDR-66-44)
AD-631 239 FLD. 20/9

•ARPA ORDER-624
TELEDYNE INDUSTRIES INC ALEXANDRIA
VA EARTH SCIENCES DIV
SDL-144
AD-631 240 FLD. 8/11

•AT(11-1)-1198
ILLINOIS UNIV URBANA DEPT OF
CHEMISTRY AND CHEMICAL
ENGINEERING
COO-1198-255
AD-631 481 FLD. 7/5

•(AT-49-2)-2505
NAVAL RADIOLOGICAL DEFENSE LAB SAN
FRANCISCO CALIF
USNRDL-TR-987
AD-631 198 FLD. 20/8

•DA-01-021-AMC-12396(Z) PT. 1
AUBURN UNIV ALA
AD-631 593 FLD. 7/2

•DA-01-021-AMC-12820(Z)
ARKANSAS UNIV FAYETTEVILLE PLASMA
LAB
UAPL-26
AD-631 743 FLD. 20/3

•DA-04-495-AMC-796(A)
TRW SYSTEMS REDONDO BEACH CALIF
9489-6007-R0000
F AD-631 458 FLD. 11/7

•DA-04-495-ORD-18
JET PROPULSION LAB CALIF INST OF
TECH PASADENA
AD-631 495 FLD. 14/4

•DA-04-495-ORD-1723
HUGHES AIRCRAFT CO CULVER CITY
CALIF
AD-631 383 FLD. 11/5
AD-631 384 FLD. 11/5

•DA-18-035-AMC-298(A)
BATTELLE MEMORIAL INST COLUMBUS
OHIO
F AD-631 742 FLD. 6/18

•DA-18-108-405-CML-1031
BATTELLE MEMORIAL INST COLUMBUS
OHIO
F AD-631 742 FLD. 6/18

•DA-19-129-AMC-91(N)
PILLSBURY MILLS INC MINNEAPOLIS
MINN
(USA-NLABS-FD-66-20)
AD-631 689 FLD. 6/8

•DA-19-129-AMC-220(N)
EMERSON AND CUMING INC CANTON MASS
(ANL-66-5-CM)
AD-631 568 FLD. 17/9

•DA-19-129-QM-1998
LITTON SYSTEMS INC ST PAUL MINN
APPLIED SCIENCE DIV
(ANL-TR-66-2-CM)
F AD-631 295 FLD. 11/5

•DA-22-079-ENG-340
MICHIGAN UNIV ANN ARBOR
(AEWES-CR-2-146)
F AD-631 369 FLD. 13/13

•DA-22-079-ENG-381
SOUTHWEST RESEARCH INST SAN
ANTONIO TEX DEPT OF AUTOMOTIVE
RESEARCH
SWRI-AR-521
(AEWES-CR-2-138)
AD-631 560 FLD. 8/13

•DA-28-043-AMC-00073(E)
ILLINOIS UNIV URBANA COORDINATED
SCIENCE LAB
R-284
AD-631 691 FLD. 9/5
R-257
AD-631 692 FLD. 9/2
AD-631 712 FLD. 5/1

•DA-28-043-AMC-00122(E)
INTERMOUNTAIN WEATHER INC SALT LAKE
CITY UTAH
(ECOM-00122-F)
F AD-631 490 FLD. 4/2

•DA-28-043-AMC-01424(E)
PHILCO CORP LANSDALE PA
(ECOM-01424-2)
AD-631 491 FLD. 9/1

•DA-28-043-AMC-00231(E)
RCA LABS PRINCETON N J
AD-631 408 FLD. 9/1
AD-631 409 FLD. 9/1

•DA-28-043-AMC-00379(E)
ELECTRONIC DEFENSE LABS SYLVANIA
ELECTRONIC SYSTEMS-WEST MOUNTAIN
VIEW CALIF
EDL-M871
AD-631 347 FLD. 9/5

•DA-28-043-AMC-00423(E)
NORTRONICS NEWBURY PARK CALIF
APPLIED RESEARCH DEPT
NARD-65-18R
(ECOM-00423-3)
AD-631 367 FLD. 20/12

•DA-28-043-AMC-01273(E)
ARACON GEOPHYSICS CO CONCORD MASS
9621-10
(ECOM-01273-3)
AD-631 509 FLD. 4/2

•DA-28-043-AMC-01313(E)
HUGHES AIRCRAFT CO FULLERTON CALIF
FR-66-17-57
(ECOM-01313-3)
AD-631 705 FLD. 9/5

•DA-28-043-AMC-01344(E)
UNION CARBIDE CORP PARMA OHIO
RESEARCH LAB
7
(ECOM-01344-3)
AD-631 368 FLD. 10/2

•DA-28-043-AMC-01470(E)
AMERICAN ELECTRONIC LABS INC
COLMAR PA
(ECOM-01470-1)
AD-631 426 FLD. 9/1

•DA-28-043-AMC-01471(S)
ITT FEDERAL LABS NUTLEY N J
5
AD-631 497 FLD. 9/2

•DA-28-043-AMC-01482(E)
BENDIX RADIO DIV BENDIX CORP
BALTIMORE MD
(ECOM-01482-2)
AD-631 412 FLD. 9/5

•DA-28-043-AMC-01508(E)
SONOTONE CORP ELMSFORD N Y
(ECOM-01508-1)
AD-631 271 FLD. 10/3

•DA-28-043-AMC-01520(E)
MARTIN CO BALTIMORE MD
(ECOM-01520-2)
AD-631 266 FLD. 9/1

•DA-28-043-AMC-01542(E)
ELECTRO-VOICE INC BUCHANAN MICH
(ECOM-01542-2)
AD-631 492 FLD. 17/2.1

•DA-28-043-AMC-02105(E)
RAVEN INDUSTRIES INC SIOUX FALLS S
DAK
0766
(ECOM-02105-F)
F AD-631 696 FLD. 4/2

•DA-28-AMC-00459(E)
RADIO CORP OF AMERICA CAMDEN N J
COMMUNICATIONS SYSTEMS DIV
(ECOM-00459-3)
AD-631 603 FLD. 9/5

•DA-31-124-ARO(D)-36
SYRACUSE UNIV N Y
(AROD-3901:7)
AD-631 788 FLD. 12/1

•DA-31-124-ARO(D)-62
HERCULES RESEARCH CENTER
WILMINGTON DEL
(AROD-4136:11)
AD-631 550 FLD. 7/4

•DA-31-124-ARO(D)-73
STANFORD UNIV CALIF DEPT OF
MATERIALS SCIENCE
(AROD-4119:7)
AD-631 744 FLD. 20/12
(AROD-4119:8)
AD-631 791 FLD. 20/12

•DA-31-124-ARO(D)-95
GENERAL ELECTRIC CO SCHENECTADY N
Y RESEARCH AND DEVELOPMENT CENTER
(AROD-4074:2)
F AD-631 708 FLD. 11/6
REPRINT-5322
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AD-631 792 FLD. 20/2

•DA-31-124-ARO(D)-123
PENNSYLVANIA UNIV PHILADELPHIA
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(AROD-2056:16)
AD-631 373 FLD. 12/1

•DA-31-124-ARO(D)-131
CARNEGIE INST OF TECH PITTSBURGH
PA DEPT OF ELECTRICAL ENGINEERING
(AROD-3397:13)
AD-631 818 FLD. 20/2
(AROD-3397:12)
AD-631 819 FLD. 20/12
(AROD-3397:10)
AD-631 820 FLD. 20/12

•DA-31-124-ARO(D)-138
PURDUE RESEARCH FOUNDATION
LAFAYETTE IND
(AROD-4332:3)
AD-631 549 FLD. 20/4

•DA-31-124-ARO(D)-142
FRANKLIN INST RESEARCH LABS

PHILADELPHIA PA CHEMISTRY DIV
82130-T-9
(AROD-4168:9)
AD-631 698 FLD. 20/12

•DA-31-124-ARO(D)-169
RESEARCH TRIANGLE INST DURHAM N C
(AROD-3418:3)
AD-631 366 FLD. 7/5

•DA-31-124-ARO(D)-173
DELAWARE UNIV NEWARK DEPT OF PHYSICS
TR-6
(AROD-4461:6)
AD-631 740 FLD. 20/12

•DA-31-124-ARO(D)-201
ALLIED CHEMICAL CORP MORRISTOWN N J CENTRAL RESEARCH LAB
(AROD-4993:1)
F AD-631 374 FLD. 7/4

•DA-31-124-ARO(D)-222
NORTHWESTERN UNIV EVANSTON ILL DEPT OF CHEMISTRY
(AROD-4729:2)
AD-631 794 FLD. 7/2

•DA-31-124-ARO(D)-277
NORTH CAROLINA STATE UNIV RALEIGH DEPT OF ENGINEERING RESEARCH
(AROD-5010:7)
AD-631 543 FLD. 11/6

•DA-31-124-ARO(D)-325
CORNELL UNIV ITHACA N Y
(AROD-5329:4)
AD-631 547 FLD. 20/9

•DA-36-039-AMC-02349(E)
THOMAS J WATSON RESEARCH CENTER YORKTOWN HEIGHTS N Y
F AD-631 499 FLD. 20/5

•DA-36-039-AMC-03742(E)
HAMILTON STANDARD DIV UNITED AIRCRAFT CORP BROAD BROOK CONN
HSER-3133
(ECOM-03742-6)
AD-631 288 FLD. 9/5

•DA-36-039-AMC-06187(E)
GENERAL ELECTRIC CO AUBURN N Y SEMICONDUCTOR PRODUCTS DEPT
AD-631 364 FLD. 9/1

•DA-36-039-AMC-06163(E)
TRW SEMICONDUCTORS INC LAWNDALE CALIF RESEARCH AND DEVELOPMENT DEPT
AD-631 522 FLD. 9/1

•DA-36-039-SC-86717
MIDLAND-WRIGHT KANSAS CITY KANS
AD-631 402 FLD. 9/1

•DA-36-039-SC-86741
AEROPROJECTS INC WEST CHESTER PA
AD-631 489 FLD. 13/8

•DA-44-009-AMC-54(T)
TEXAS INSTRUMENTS INC DALLAS
TI-08-66-02
F AD-631 500 FLD. 10/2

•DA-44-009-AMC-1563(T)
INSTITUTE OF MODERN LANGUAGES INC WASHINGTON D C
(AERDL-T-1838-66)
AD-631 432 FLD. 11/6
(AERDL-T-1831-66)
AD-631 433 FLD. 11/2
(AERDL-T-1832-66)
AD-631 434 FLD. 7/4

•DA-44-009-ENG-4604
TRANE CO LA CROSSE WIS
(AERDL-1841)
F AD-631 325 FLD. 13/1

•DA-44-177-AMC-102(T)
BERGEN RESEARCH ENGINEERING CORP TETERBORO N J
8314-R3
(USAAVLABS-TR-64-30)
F AD-631 466 FLD. 1/3

•DA-44-177-AMC-189(T)
NORTH AMERICAN AVIATION INC COLUMBUS OHIO
(USAAVLABS-TR-66-5)
F AD-631 467 FLD. 1/3

•DA-44-177-AMC-198(T)
CORNELL AERONAUTICAL LAB INC BUFFALO N Y
CAL-BB-1959-S-1
(USAAVLABS-TR-66-13)
AD-631 494 FLD. 1/1

•DA-44-177-AMC-254(T)
AVIATION SAFETY ENGINEERING AND RESEARCH PHOENIX ARIZ
AVSER-65-15
(USAAVLABS-TR-66-29)
F AD-631 493 FLD. 6/17
AVSER-65-17
(USAAVLABS-TR-66-24)
F AD-631 610 FLD. 1/2

•DA-44-177-AMC-877(T)
HUGHES TOOL CO CULVER CITY CALIF AIRCRAFT DIV
HTC-AD-65-13
(USAAVLABS-TR-65-68)
AD-631 913 FLD. 1/3

•DA-44-177-TC-393
WILSON NUTTALL RAIMOND ENGINEERS INC CHESTERTOWN MD
(TRECOM-TR-63-19)
AD-631 733 FLD. 8/6

•DA-44-188-ARO-2
HUMAN RESOURCES RESEARCH OFFICE GEORGE WASHINGTON UNIV ALEXANDRIA VA
TR-69-17
AD-631 208 FLD. 5/9

•DA-49-146-XZ-224
ENGINEERING-PHYSICS CO ROCKVILLE MD
(DASA-1931-2)
AD-631 496 FLD. 14/2

•DA-49-146-XZ-226
EDGERTON GERMESHAUSEN AND GRIER INC SANTA BARBARA CALIF
(AFRRI-CR-65-4)
AD-631 318 FLD. 18/4

•DA-49-146-XZ-254
RADIATION RESEARCH ASSOCIATES INC FORT WORTH TEX
RRA-M-42
(AFRRI-CR-65-5)
AD-631 747 FLD. 18/8

•DA-49-146-XZ-408
EDGERTON GERMESHAUSEN AND GRIER INC SANTA BARBARA CALIF
S-296-R
(AFRRI-CR65-7)
AD-631 319 FLD. 18/4

•DA-49-186-AMC-28(X)
JOHNSON SERVICE CO MILWAUKEE WIS
F AD-631 561 FLD. 13/7

•DA-49-193-MD-2060
ILLINOIS UNIV URBANA GROUP EFFECTIVENESS RESEARCH LAB
TR-20
AD-631 741 FLD. 5/10

•DA-49-193-MD-2281
IIT RESEARCH INST CHICAGO ILL
IITRI-L6021-6
AD-631 739 FLD. 6/6

•DA-49-193-MD-2432
EMORY UNIV ATLANTA GA SCHOOL OF MEDICINE
AD-631 548 FLD. 6/16

•DA-49-193-MD-2549
HARRY S TRUMAN LAB KANSAS CITY GENERAL HOSPITAL MO
AD-631 403 FLD. 6/13

•DA-49-193-MD-2627
DELAWARE UNIV NEWARK
AD-631 739 FLD. 6/19

•DA-AMC-28-043-64-G7
LEHIGH UNIV BETHLEHEM PA INST OF RESEARCH
F AD-631 636 FLD. 9/1

•DA-ARO(D)-31-124-G13
STANFORD UNIV CALIF DEPT OF MECHANICAL ENGINEERING
P-2257
(AROD-2257:7)
F AD-631 280 FLD. 20/13

•DA-ARO(D)-31-124-G78
CARNEGIE INST OF TECH PITTSBURGH PA
(AROD-223:65)
AD-631 551 FLD. 12/2

•DA-ARO(D)-31-124-G191
CALIFORNIA UNIV DAVIS
(AROD-3235:13)
F AD-631 283 FLD. 7/2

•DA-ARO(D)-31-124-G198
COLORADO UNIV BOULDER
(AROD-3292:5)
F AD-631 282 FLD. 7/2

•DA-ARO(D)-31-124-G210
SYRACUSE UNIV RESEARCH INST N Y DEPT OF MECHANICAL AND AEROSPACE ENGINEERING
ME-931-1256-6603-F
(AROD-3242:6)
F AD-631 286 FLD. 20/4
ME-931-6603-IT
(AROD-3242:5)
AD-631 287 FLD. 20/4

•DA-ARO(D)-31-124-G250
RESEARCH TRIANGLE INST DURHAM N C
(AROD-3418:3)
AD-631 366 FLD. 7/5

•DA-ARO(D)-31-124-G371
NEW YORK UNIV N Y DEPT OF INDUSTRIAL ENGINEERING AND OPERATIONS RESEARCH
(AROD-3133:5)
AD-631 739 FLD. 5/1

•DA-ARO(D)-31-124-G479
NEW YORK UNIV N Y DEPT OF INDUSTRIAL ENGINEERING AND OPERATIONS RESEARCH
(AROD-3133:5)
AD-631 739 FLD. 5/1

•DA-ARO(D)-31-124-G523
NEW YORK UNIV N Y DEPT OF PHYSICS
TR-A65-4
(AROD-4614:5)
AD-631 806 FLD. 20/13

•DA-ARO(D)-31-124-G528
IIT RESEARCH INST CHICAGO ILL TECHNOLOGY CENTER
IITRI-B6047-4
(AROD-4518:7)
F AD-631 339 FLD. 20/2

•DA-ARO(D)-31-124-G615
SYRACUSE UNIV RESEARCH INST N Y DEPT OF MECHANICAL AND AEROSPACE ENGINEERING
ME-931-1256-6603-F
(AROD-3242:6)

F AD-631 286 FLD. 20/4
ME-931-6603-IT
(AROD-3242:5)
AD-631 287 FLD. 20/4

•DA-AROD-31-124-6676
MARYLAND UNIV COLLEGE PARK INST FOR FLUID DYNAMICS AND APPLIED MATHEMATICS
BN-919
(AROD-407:69)
AD-631 808 FLD. 20/4

•DA-ENG-11•190-61-63
ALASKA UNIV COLLEGE GEOPHYSICAL INST
UAG-R-173
AD-631 593 FLD. 4/2

•DA-ENG-27-021-62-65
ALASKA UNIV COLLEGE GEOPHYSICAL INST
UAG-R-173
AD-631 593 FLD. 4/2

•DRB-9329-20
BRITISH COLUMBIA UNIV VANCOUVER DEPT OF SURGERY RESEARCH LAB
AD-631 815 FLD. 6/12

•DRB-9530-31
BRITISH COLUMBIA UNIV VANCOUVER DEPT OF CHEMISTRY
AD-631 814 FLD. 7/4

•N140(70029)-71898B
LITTON SYSTEMS INC WALTHAM MASS
TR-65-8-BF
AD-631 620 FLD. 17/2

•N140(70029)-75103B
LITTON SYSTEMS INC WALTHAM MASS
TR-65-8-BF
AD-631 620 FLD. 17/2

•N156-95230
NORTH AMERICAN AVIATION INC COLUMBUS OHIO
AD-631 656 FLD. 1/3
AD-631 660 FLD. 1/3

•N600(19)59507
NEW HAMPSHIRE UNIV DURHAM
F AD-631 960 FLD. 20/1

•N61339-1526
PENNSYLVANIA RESEARCH ASSOCIATES INC PHILADELPHIA
(NTDC-1526-1)
F AD-631 592 FLD. 17/9

•N62558-2882
HEBREW UNIV JERUSALEM (ISRAEL)
TR-21
AD-631 784 FLD. 12/1

•N62558-4297
QUEEN'S UNIV BELFAST (NORTHERN IRELAND) SCHOOL OF PHYSICS AND APPLIED MATHEMATICS
AD-631 602 FLD. 20/8

•N62558-4695
HEBREW UNIV JERUSALEM (ISRAEL)
TR-22
AD-631 748 FLD. 9/2

•N70029-1273
GENERAL DYNAMICS CORP GROTON CONN ELECTRIC BOAT DIV
U411-63-054
AD-631 344 FLD. 17/1

•NAS8-5020
LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF
AD-631 604 FLD. 22/3

•NAS8-5024
LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF
AD-631 604 FLD. 22/3

•NBY-17792
HINCHMAN CORP DETROIT MICH
AD-631 417 FLD. 20/14
AD-631 418 FLD. 20/14

•NBY-24936
ARMOUR RESEARCH FOUNDATION CHICAGO ILL
F AD-631 346 FLD. 20/3

•NBY-95847
CLAPP (WILLIAM F) LABS INC DUXBURY MASS
13961
A AD-631 328 FLD. 11/12

•NBY-62190
SCIENCE ENGINEERING ASSOCIATES INC SAN MARINO CALIF•
(NCEL-CR-66.003)
F AD-631 464 FLD. 13/10

•NOBS-90100
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF NAVAL ARCHITECTURE AND MARINE ENGINEERING
65-8
AD-631 780 FLD. 13/10

•NOBS-92130
SOUTHWEST RESEARCH INST SAN ANTONIO TEX
F AD-631 632 FLD. 13/13

•NOBSR-89126
COMPUTER APPLICATIONS INC NEW YORK
CAI-NY-6052-VOL-1
AD-631 525 FLD. 14/4
CAI-NY-6052-VOL-2
AD-631 526 FLD. 14/4
CAI-NY-6052-VOL 3
AD-631 527 FLD. 14/4

•NOBSR-89483
GOODRICH (B F) AEROSPACE AND DEFENSE PRODUCTS AKRON OHIO
31
AD-631 328 FLD. 17/1

•NOBSR-93043
GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND DEVELOPMENT CENTER
AD-631 330 FLD. 9/1

•NONR-222(51)
CLINICAL INVESTIGATION CENTER OAKLAND CALIF
GIC-TR-24
(NAVMED-MR005.12-1200-4)
AD-631 609 FLD. 6/5

•NONR-222(83)
OPERATIONS RESEARCH CENTER UNIV OF CALIF BERKELEY
ORC-65-26
AD-631 370 FLD. 12/2
ORC-66-9
AD-631 810 FLD. 12/2

•NONR-225(78)
MICROWAVE LAB STANFORD UNIV CALIF
ML-1421
AD-631 611 FLD. 7/4

•NONR-228(27)
UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF PHYSICS
USC-VACUV-105
AD-631 482 FLD. 7/4

•NONR-248(60)
JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF MICROBIOLOGY
AD-631 614 FLD. 6/1

•NONR-551(52)
MOORE SCHOOL OF ELECTRICAL ENGINEERING UNIV OF PENNSYLVANIA PHILADELPHIA
1
AD-631 617 FLD. 6/18

•NONR-562(39)
BROWN UNIV PROVIDENCE R I DIV OF ENGINEERING
10
AD-631 734 FLD. 20/4

•NONR-562(90)
BROWN UNIV PROVIDENCE R I DIV OF APPLIED MATHEMATICS
TR-4
AD-631 419 FLD. 20/11

•NONR-609(53)
GIBBS LAB YALE UNIV NEW HAVEN CONN
AD-631 303 FLD. 20/8

•NONR-669(12)
SYRACUSE UNIV N Y DEPT OF PHYSICS
(ONR-66-1)
AD-631 704 FLD. 20/10

•NONR-710(54)
MINNESOTA UNIV MINNEAPOLIS
(AFOSR-66-0263)
AD-631 621 FLD. 12/1

•NONR-760(09)
CARNEGIE INST OF TECH PITTSBURGH PA DEPT OF ELECTRICAL ENGINEERING
AD-631 294 FLD. 9/1
TR-28
AD-631 296 FLD. 9/5
AD-631 297 FLD. 20/3
AD-631 298 FLD. 9/1

•NONR-760(15)
CARNEGIE INST OF TECH PITTSBURGH PA DEPT OF PHYSICS
TR-23
AD-631 231 FLD. 20/8

•NONR-991(00)
GEORGIA INST OF TECH ATLANTA ENGINEERING EXPERIMENT STATION
AD-631 382 FLD. 20/2

•NONR-991(06)
GEORGIA INST OF TECH ATLANTA ENGINEERING EXPERIMENT STATION
AD-631 382 FLD. 20/2

•NONR-1181(12)
DUKE UNIV DURHAM N C DEPT OF PHYSICS
AD-631 387 FLD. 20/8

•NONR-1228(35)
NORTHWESTERN UNIV EVANSTON ILL DEPT OF GEOGRAPHY
TR-4
AD-631 725 FLD. 8/6
TR-7
AD-631 726 FLD. 8/6
TR-6
AD-631 728 FLD. 8/6
TR-3
AD-631 751 FLD. 8/6
TR-5
AD-631 789 FLD. 8/6

•NONR-1228(36)
NORTHWESTERN UNIV EVANSTON ILL DEPT OF GEOLOGY
TR-1
AD-631 716 FLD. 8/2

•NONR-1509(06)
IOWA UNIV IOWA CITY DEPT OF PHYSICS AND ASTRONOMY
U. OF IOWA-66-8
AD-631 345 FLD. 4/1

•NONR-1575(04)
LOUISIANA STATE UNIV BATON ROUGE DEPT OF CHEMISTRY
TR-60
AD-631 625 FLD. 7/4

TR-61
AD-631 626 FLD. 7/4

•NONR-1622(15)
LOBUND LAB UNIV OF NOTRE DAME IND
AD-631 333 FLD. 6/5

•NONR-1834(03)
ILLINOIS UNIV URBANA DEPT OF CIVIL ENGINEERING
STRUCTURAL RESEARCH SER-302
AD-631 501 FLD. 13/13

•NONR-1834(05)
ILLINOIS UNIV URBANA DEPT OF CHEMISTRY AND CHEMICAL ENGINEERING
COO-1198-355
AD-631 481 FLD. 7/5

•NONR-1834(19)
ILLINOIS UNIV URBANA DEPT OF PHYSICS
AD-631 203 FLD. 20/12

•NONR-1834(27)
ILLINOIS UNIV URBANA DEPT OF COMPUTER SCIENCE
194
AD-631 782 FLD. 9/2

•NONR-1858(16)
PRINCETON UNIV N J ECONOMETRIC RESEARCH PROGRAM
RM-80
AD-631 736 FLD. 5/3

•NONR-1866(16)
CRUFT LAB HARVARD UNIV CAMBRIDGE MASS
CRUFT-TR-488
AD-631 693 FLD. 9/4

•NONR-1866(37)
HARVARD UNIV CAMBRIDGE MASS DEPT OF STATISTICS
TR-1
AD-631 441 FLD. 12/1
TR-2
AD-631 452 FLD. 12/1

•NONR-2121(13)
CHICAGO UNIV ILL INST FOR THE STUDY OF METALS
TR-17
AD-631 201 FLD. 20/3
TR-15
AD-631 202 FLD. 20/3

•NONR-2196(00)
WOODS HOLE OCEANOGRAPHIC INSTITUTION MASS
WHOI-REF-66-14
AD-631 686 FLD. 8/10
WHOI-REF-66-9
AD-631 687 FLD. 8/10

•NONR-2216(00)
CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF THE AEROSPACE AND MECHANICAL ENGINEERING SCIENCES
AD-631 195 FLD. 7/2

•NONR-2216(05)
SCRIPPS INSTITUTION OF OCEANOGRAPHY SAN DIEGO CALIF MARINE PHYSICAL LAB
SIO-REF-66-3
AD-631 260 FLD. 13/10

•NONR-2587(05)
MICHIGAN STATE UNIV EAST LANSING DEPT OF STATISTICS
MSU-RM-193-VKR-1
AD-631 619 FLD. 12/1

•NONR-3292(03)
CONNECTICUT UNIV STORRS DEPT OF STATISTICS
RR-16
AD-631 528 FLD. 12/2

•NONR-3608(00)
NATIONAL RESEARCH CORP CAMBRIDGE MASS NORTON EXPLORATORY RESEARCH DIV
AD-631 265 FLD. 7/4

•NONR-3656(12)
CALIFORNIA UNIV SAN FRANCISCO MEDICAL CENTER
AD-631 193 FLD. 6/5
AD-631 194 FLD. 6/5

•NONR-3993(00)
WEATHER SQUADRON (7TH) DETACHMENT 6
F AD-631 480 FLD. 6/3

•NONR-4010(09)
JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF STATISTICS
AD-631 192 FLD. 12/1

•NONR-4102(01)
MASSACHUSETTS INST OF TECH CAMBRIDGE
MAC-TR-29
AD-631 396 FLD. 9/2
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF ELECTRICAL ENGINEERING
MAC-TR-26(THESIS)
AD-631 269 FLD. 9/2

•NONR-4289(01)
TENNESEE UNIV KNOXVILLE ULTRASONICS LAB
TR-1
AD-631 332 FLD. 20/1

•NONR-4309(00)
HUNTER COLL OF THE CITY UNIV OF NEW YORK
TR-6
AD-631 523 FLD. 5/10
TR-7
AD-631 524 FLD. 5/10

•NONR-4336(00)
DELAWARE UNIV NEWARK DEPT OF PHYSICS
TR-7
AD-631 302 FLD. 20/2

•NONR-4424(00)
LITTLE (ARTHUR D) INC CAMBRIDGE MASS
TR-21
AD-631 807 FLD. 8/10

•NONR-4440(00)
LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF ELECTRONIC SCIENCES LAB
M-21-66-1-PT-1
A AD-631 241 FLD. 5/2
M-21-66-2-PT-2
AD-631 242 FLD. 5/2

•NONR-4859(00)
SCHJELDAHL (G T) CO NORTHFIELD MINN
F AD-631 331 FLD. 4/2

•NONR-4951(00)
LITTON SYSTEMS INC WOODLAND HILLS CALIF GUIDANCE AND CONTROL SYSTEMS DIV
PUB-4902
AD-631 663 FLD. 1/4

•NONR(G)-00034-65
CASE INST OF TECH CLEVELAND OHIO
AD-631 479 FLD. 14/2

•NONR(G)-00049-64
TEXAS UNIV AUSTIN DEPT OF ASTRONOMY
F AD-631 697 FLD. 3/2

•NORD-7386
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
TG-469
AD-631 639 FLD. 14/2
TG-467
AD-631 644 FLD. 14/2
TG-465
AD-631 646 FLD. 16/1
CM-912
AD-631 723 FLD. 21/2

•NORD-9195
DEFENSE RESEARCH LAB UNIV OF TEXAS AUSTIN
DRL-362
AD-631 816 FLD. 20/11
ELECTRICAL ENGINEERING RESEARCH LAB UNIV OF TEXAS AUSTIN
EERL-3-16
AD-631 435 FLD. 20/14

•NORD-16498
DEFENSE RESEARCH LAB UNIV OF TEXAS AUSTIN
DRL-376
AD-631 648 FLD. 20/11
DRL-410
AD-631 649 FLD. 20/4

•NOW-62-0604-C
ESSO DEVELOPMENT CO LTD ABINGDON (ENGLAND)
TG-481
AD-631 638 FLD. 21/2
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
TG-809
AD-631 363 FLD. 20/11
TRANS-1592 (TT-66-61110)
AD-631 630 FLD. 20/4
TG-537
AD-631 640 FLD. 21/8.2
TG-522A
AD-631 643 FLD. 22/2
TG-539
AD-631 645 FLD. 9/6
TG-461
AD-631 647 FLD. 14/2
TG-477
AD-631 650 FLD. 22/3
TG-540
AD-631 651 FLD. 20/9
TG-496
AD-631 652 FLD. 22/3
TG-610-6
AD-631 653 FLD. 21/4
TG-492-1
AD-631 699 FLD. 16/4.2
CF-29070A
AD-631 700 FLD. 10/3
TG-522
AD-631 713 FLD. 22/2
TG-538
AD-631 714 FLD. 13/12
TG-610-4
AD-631 715 FLD. 21/5
TG-456
AD-631 721 FLD. 21/2
CF-30088A
AD-631 722 FLD. 22/4
TG-519-109
AD-631 724 FLD. 22/3
TG-454
AD-631 771 FLD. 14/2
TG-543
AD-631 801 FLD. 4/1
TG-571
AD-631 802 FLD. 17/3
TG-548
AD-631 804 FLD. 22/3
TG-716
AD-631 805 FLD. 20/4
TG-610-5
AD-631 817 FLD. 21/5
TG-552
AD-631 821 FLD. 14/2
TG-559
AD-631 822 FLD. 9/5
TG-551
AD-631 823 FLD. 14/2
TG-555
AD-631 824 FLD. 22/3

TG-595
AD-631 829 FLD. 14/2
TG-561
AD-631 826 FLD. 22/3
TG-569
AD-631 827 FLD. 8/5
TG-559
AD-631 828 FLD. 22/2
TG-579
AD-631 829 FLD. 12/1
TG-615
AD-631 831 FLD. 11/9

•NOW-62-0606-C
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
TG-570
AD-631 830 FLD. 9/2

•NOW-63-0050
LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF
AD-631 600 FLD. 22/2

•NOW-64-0282C
DOUGLAS AIRCRAFT CO INC LONG BEACH CALIF AIRCRAFT DIV
LB-32999
AD-631 329 FLD. 20/4

•NOW-65-0289-C
BENDIX MISHAWAKA DIV BENDIX CORP IND
BXM-5930
F AD-631 993 FLD. 16/4.2

•NSF-G-19372
JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF MICROBIOLOGY
AD-631 614 FLD. 6/1

•NSF-GK-59
PRINCETON UNIV N J GAS DYNAMICS LAB
796
AD-631 737 FLD. 20/4

•NSF-GK-690
ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB
R-257
AD-631 692 FLD. 9/2

•NSF-GP-4593
OPERATIONS RESEARCH CENTER UNIV OF CALIF BERKELEY
ORC-66-9
AD-631 810 FLD. 12/2

•NSG-229-62
IOWA UNIV IOWA CITY DEPT OF PHYSICS AND ASTRONOMY
U. OF IOWA-66-8
AD-631 345 FLD. 4/1

•NSG-269-62
SOUTHWEST CENTER FOR ADVANCED STUDIES DALLAS TEX
(AFOSR-66-0979)
AD-631 375 FLD. 20/10

•NSG-696
ARIZONA UNIV TUCSON ENGINEERING EXPERIMENT STATION
EES-SERIES-5
(AFOSR-65-2313)
AD-631 635 FLD. 9/2

•OCD-PS-64-50
IIT RESEARCH INST CHICAGO ILL TECHNOLOGY CENTER
F AD-631 924 FLD. 13/13
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631 403	6/13
631 404	3/2
631 405	5/9
631 406	13/13
631 407	13/8
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631 584	9/9
631 585	22/2
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631 587	9/1
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631 771	14/2
631 772	20/1
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CIVILIAN AGENCY RESEARCH REPORTS AND RELATED MATERIAL

1. AERONAUTICS

AD-451 469 **Field 1A**
CFSTI Price: HC$81.40
Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
SUPERSONIC FLOW ABOUT RIGHT CIRCULAR CONES AT ZERO YAW IN AIR AT THERMODYNAMIC EQUILIBRIUM. PART III. TABLES OF DATA, CONT.,
by Henry E. Hudgins, Jr. Sep 64, 818p Technical memo. TM-1493
Proj. DA-1A013001A-039
N65 15550

Descriptors: (*Supersonic flow, Conical bodies), (*Conical bodies, Supersonic characteristics), Tables, Air, Chemical equilibrium, Thermodynamics.

The material is a continuation of Part II (AD-628 539) and presents the cone flow properties of air in chemical equilibrium for altitudes from 100,000 to 200,000 feet at cone angles of 2.5 deg to 50 deg, and various Mach numbers from 3.0 to 40.0. Part II presents the cone properties for altitudes from sea level to 80,000 feet. Part I (AD-468 284) presents an analysis and correlation of this data. The Table of Symbols has been reproduced in ths report for the convenience of the reader. Further details may be obtained from Part II.

AD-451 726 **Field 1A, 7D**
CFSTI Price: HC$3.60
General Applied Science Labs., Inc., Westbury, N. Y.
AN APPROXIMATE ANALYSIS OF THE CONTINUUM LOW DENSITY HYPERSONIC FLOW OF A CHEMICALLY REACTING AND RADIATING GAS OVER A BLUNT NOSED BODY,
by Massimo Trella and Roberto Vaglio-Laurin, 26 Oct 64, 38p Technical rept. TR-414
Contract SD-149, ARPA Order-396

Descriptors: (*Hypersonic flow, Blunt bodies), (*Blunt bodies, Hypersonic characteristics), Reentry vehicles, Density, Approximation (Mathematics), Chemical reactions, Integral equations, Shock waves, Numerical analysis, Atmosphere entry, Boundary layer.

The continuum low density hypersonic flow of a chemically reacting and radiating gas over a blunt body is analyzed by an approximate technique based on a recent alternative formulation of the well-known method of integral relations. Specifically, approximations are introduced for the streamwise variations of several flow properties, while detailed radial profiles, (consistent with the stipulated procedure) are sought by numerical analysis along normals to the body (essentially normals to streamlines); the particular formulation allows careful analysis of the large changes in physico-chemical properties of the gas between body and shock, as are to be encountered at the low Reynolds numbers where viscous effects are important over the entire shock layer. Detailed derivations of the simplified system of ordinary differential equations and of the boundary conditions governing the problem is presented. An outline of numerical procedures for applications is also given. (Author)

AD-452 471 **Field 1A, 20M**
CFSTI Price: HC$16.70
Naval Ordnance Lab., White Oak, Md.
CHARACTERISTICS OF THE TURBULENT BOUNDARY LAYER WITH HEAT AND MASS TRANSFER AT M=6.7.
Final rept.,
by James E. Danberg, 19 Oct 64, 171p
NOLTR-64-99, Aerodynamics Research-228
Task RMGA-42-034/212-1/F009-10-001

Descriptors: (*Turbulent boundary layer, Thermodynamics), (*Heat transfer, Turbulent boundary layer), (*Mass transfer, Turbulent boundary layer), (*Aerodynamic heating, Cooling), Evaporation, Skin friction, Drag, Flat plate models, Thickness, Hypersonic flight.

Effects of air transpiration and wall temperature on turbulent boundary layer characteristics were measured on a porous flat plate at M=6.7. The velocity profile is described by a mixing length analysis, the velocity being in a form similar to the incompressible semi-logarithmic law. From this equation, the skin friction was calculated and found to agree with measurements. Heat transfer can be evaluated from Reynolds analogy, experimentally verified with and without air transpiration. (Author)

AD-456 988 **Field 1A**
CFSTI Price: HC$2.60
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
INVESTIGATION OF DRAG REDUCTION BY BOUNDARY -LAYER SUCTION ON A BODY OF REVOLUTION AT MACH NUMBERS 2.5, 3, AND 3.5.
Technical rept.,
by S. R. Pate, Feb 65, 30p AEDC-TR-65-36
Contract AF 40 (600)-1000,
Proj. AF-1366
N65 17918
Prepared in cooperation with ARO, Inc., Arnold Air Force Station, Tenn.

Descriptors: (*Drag, Reduction), (*Supersonic flow, Drag), Boundary layer, Bodies of revolution, Effective ness, Reynolds number, Angle of attack, Wake, Force (Mechanics), Pressure.

Tests were conducted in a 40-in. supersonic tunnel to determine the effectiveness of boundary-layer suction for laminar flow control on a 9.2-in.-diam body of revolution at Mach 2.5, 3, and 3.5 with a Reynolds number range (based on boundary-layer rake location) from 9.9 to 51.7 million for angles of attack from 0 to plus or minus 2 deg. The condition of the boundary layer was very sensitive to changes in angle of attack. Increasing the Reynolds number also decreased the maximum angle of attack. Wake, suction, and total drag coefficients and the corresponding suction coefficients are presented, along with some fully turbulent wake drag coefficients for the no suction case. (Author)

AD-461 447 **Field 1C, 1B**
CFSTI Price: HC$2.00
LTV Astronautics Div., Ling-Temco-Vought, Inc., Dallas, Tex.
XC-142A VTOL TRANSPORT PROGRAM.
Monthly progress rept. no. 33,
by L. C. Josephs, Sep 64, 32p
Contract AF33 (657)-7868

Descriptors: (*Vertical take-off planes, Transport planes), (*Transport planes, Vertical take-off planes), Experimental design, Specifications, Flight tests, Aerodynamic characteristics, Performance (Engineering).

Identifiers: XC-142A aircraft.

The first flight of the XC-142A took place on 29 September. The flight, made on the no. 2 aircraft, was 38 minutes in length during which time the aircraft general handling characteristics were checked at an altitude of 10,000 feet and a speed of approximately 150 knots, with landing gear down throughout the entire flight; takeoff and landing were made with wing and flaps at 10 degrees. Throughout the flight, the aircraft demonstrated smooth response and stable aerodynamic characteristics. Considering the objectives remaining to be accomplished, the overall XC-142A program at the end of September was estimated to be six to seven weeks behind schedule. Fabrication of aircraft no. 3-5 remained in a three to five week behind schedule condition, primarily as the result of major component shortages. In addition to first flight, several other items of significance were accomplished in the overall test program during the month. High speed taxi tests on the no. 2 aircraft were achieved on 19 September; the 50-hour tie-down test on the no. 1 aircraft was completed on 22 September and the teardown inspection of transmission and propulsion system components was completed on 27 September. (Author)

Patent 3,229,931 **Field 1C**
EMERGENCY REMOVAL OF AIRCRAFT SUSTAINING MEANS.
Patent assigned to Army,
by Agnew F. Larsen, 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Helicopter rotors, Ejection), Patents, Aviation safety, Charges (Explosive).

A helicopter construction is provided in which conventional vertical upward occupant-seat ejection apparatus may be used for ejecting the pilot. A hatch or door is provided in the fuselage above the pilot's seat. Explosive charges are provided so that the hub and its associated rotating blades may be rapidly removed to provide clearance for ejection through the door.

PB-169 108 **Field 1A, 12A**
CFSTI Prices: HC$1.00 MF$0.50
Adelphi Univ., Garden City, N. Y. Dept. of Graduate Mathematics.
THE BOUNDARY CONDITION AT INFINITY IN THE PROBLEM OF WAVES IN A VISCOUS FLUID, I,
by Michael Yanowitch, Jul 65, 19p AGM-122
Grant NSF-GP-1804

Descriptors: (*Fluid mechanics, Incompressible flow), Viscosity, Boundary layer, Boundary value problems.

The problem of two dimensional horizontal oscillations of a viscous fluid in a half plane is discussed. It is shown that a correct 'boundary condition at infinity' is the finiteness of the average rate of energy dissipation in a column of fluid, and that the condition of boundedness of the velocity is equivalent to this. It is also shown that there can be no resonances in the above problem. (Author)

PB-169 215 **Field 1A**
CFSTI Prices: HC$4.00 MF$0.75
California Univ., Berkeley. Space Sciences Lab.
LOCAL SKIN FRICTION AND INDUCED PRESSURE MEASUREMENTS ON A SHARP-EDGED INSULATED FLAT PLATE IN LOW DENSITY HYPERSONIC FLOW.
Technical rept.,
by E. S. Moulic, Jr. 10 Jan 66, 108p Series-7-Issue-3
Grant NSF-GP-2520

Descriptors: (*Flat plate models, Hypersonic characteristics), (*Hypersonic characteristics, Flat plate models), Skin friction, Pressure, Leading edge.

PB-169 223 **Field 1A**
CFSTI Prices: HC$3.00 MF$0.75
Ballistic Research Labs., Aberdeen Proving Ground, Md.
TABLES OF SUPERSONIC FLOWS ABOUT CONE CYLINDERS. PART I. SURFACE DATA,

by R. F. Clippinger, J. H. Giese, and W. C. Carter. Jul 50, 91p BRL-729
Proj. TB3-0108H

Descriptors: (*Tables, Supersonic flow), (*Supersonic flow, Cylindrical bodies), Conical bodies, Surface properties.

A Family of inviscid steady axisymmetric supersonic flows about cone cylinders has been calculated by the method of characteristics on the ENIAC. The cones have semi-vertex angles of the form 5k degrees ($1 < k < 10$), while the Mach numbers contained in the set 1.3, 1.5, 1.7, 2, 3, 4, 5, 7, are such that the shock wave is attached to and conical near the vertex. Pressure, density, temperature, and local Mach number distributions on the cylinder have been tabulated, and the pressure data have also been presented graphically. The ENIAC results have been compared with computations from other sources and with experimental data. (Author)

PB-169 240 **Field 1A, 14B**
CFSTI Prices: HC$3.00 MF$0.75
Michigan Univ., Ann Arbor. Engineering Research Inst.
INVESTIGATION OF HEATING OF AIR STREAM IN A WIND TUNNEL BY MEANS OF AN ELECTRICAL DISCHARGE.
Final rept.,
by Haldon L. Smith and Harold C. Early. Oct 54, 91p Rept. no. 2154-3-F
Contract DA-20-018-ORD-13047,
Proj. TB3-0108

Descriptors: (*Electric arcs, Feasibility studies), (*Supersonic flow, Heating), Wind tunnels, Electric discharges.

Experiments have been made in a 'blow down' wind tunnel to test the feasibility of using an electric arc for adding heat to a Mach 4 airstream. The arc column was stabilized transverse to the flow by means of a strong magnetic field, and up to 5 kilowatts of electrical power were dissipated. However, uniform heating was not obtained, because the arc had a strong tendency to concentrate in the boundary layer and appeared to fill only about 1/2 to 2/3 of the tunnel cross section. As a means of circumventing these difficulties, several alternative electrical heating methods are proposed. It is believed that these proposed methods hold much more promise than the system which was tested. (Author)

PB-169 245 **Field 1E, 13B, 1B**
CFSTI Prices: HC$3.00 MF$0.75
Midwest Research Inst., Kansas City, Mo.
ANALYSIS OF CRITERIA FOR PAVEMENT SLOPES.
Final rept.,
by Frank Turner. May 65, 78p
Contract FAA/ARDS-569,
Projs. FAA-415-4D, MRI-2611-E
SRDS RD-65-53

Descriptors: (*Runways, Civil engineering), (*Civil engineering, Landing fields), (*Pavements, Landing fields), Airports, Experimental design, Aeronautics.

The analysis of runway gradient criteria was carried out by first deriving the relationships between grade and aircraft performance, and then applying experimental flight test data to these relationships to determine the effect of grade. A study of operating characteristics of several different types of aircraft suggested an improved method of determining effective gradient. The new effective gradients were used with individual aircraft length correction factors to accurately predict the required take-off and accelerate stop length on critical runway configurations. A study of the maximum longitudinal grade included the effect on the point of touch-down surface conditions, and the critical phases of take-off operation. Changes of grade were analyzed from consideration of acceptable levels of vertical acceleration which the surface might induce into aircraft. (Author)

PB-169 545 **Field 1B, 17G**
CFSTI Prices: HC$5.00 MF$1.00
Institute for Defense Analysis, Arlington, Va. Economic and Political Studies Div.
THE NORTH ATLANTIC AIR-TRAFFIC CONTROL SYSTEM. ECONOMIC ANALYSIS OF PROPOSED CHANGES.
Final rept.,
by Allen H. Skaggs, Norman J. Asher, Richard Halfyard, and Elizabeth Parker. Sep 65, 154p IDA/S-198, IDA/HQ 65-3898
Contract FA-65-WA-1069,
Proj. 350-103-01A
FAA RD-65-95

Descriptors: (*Economics, Air transportation), (*Air traffic control systems, Atlantic Ocean), (*Cost effectiveness, Air traffic control systems), Europe, United States, Air traffic, Costs, Scheduling, Ground support equipment, Jet transport planes, Radar scanning.

This Study is a cost-benefit analysis to determine the economic impact of implementing certain FAA-specified technical changes to the North Atlantic Air-Traffic Control System. As such, it attempts to determine which system would afford the maximum benefit to the community of countries who provide and use the system. Accordingly, it recommends which among the technically feasible changes in facilities, services, and procedures are economically justified. Two basic types of changes have been proposed: additional ground equipment to increase the capacity of the transition areas, and reduction of separation criteria in the oceanic area.

2. AGRICULTURE

PB-169 304 **Field 2C, 13M**
CFSTI Prices: HC$1.00 MF$0.50
Forest Products Lab., Madison, Wis.
CONDENSATION IN FARM BUILDINGS.
Research note.
Jan 66, 9p FPL-0114
Revision of Report no. 1186.

Descriptors: (*Buildings, Condensation), (*Condensation, Control), (*Water vapor, Buildings), Rural areas, Moisture, Humidity, Ventilation, Moistureproofing, Permeability.

The method of controlling or preventing the condensation in farm buildings and other structures involves a particular set of conditions, each of which must be considered separately. A review of the principles of water vapor and condensation is provided for the purpose of establishing a basis for analyzing the problem. The control of factors contributing to condensation by means of ventilation, vapor-permeable constructions, and vapor barriers is discussed.

PB-169 707 **Field 2D, 2A**
CFSTI Prices: HC$3.00 MF$0.75
Cornell Univ., Ithaca, N. Y. Coll. of Agriculture.
1964 SUGAR BEET RESEARCH TRIALS AND DEMONSTRATIONS,
by T. W. Scott, R. L. Plaisted, and T. W. Bateman. Feb 65, 68p
Prepared in cooperation with Dept. of Agriculture, Washington, D. C.

Descriptors: (*Agriculture, New York), (*Sucrose, Agriculture), Soils, Meteorological parameters, Plants (Botany), Scientific research, Experimental data.

Identifiers: Sugar beets.

Sugar beet research plots were planted at 16 different locations in 1964. These plots were located in an 8-county area in Central New York. Planting was started on April 16th and completed by May 21st. All research plots were harvested during the month of October. Sugar beet yields ranged from 3 to 31 tons per acre. The average yield of all plots was 12.7 tons per acre. Percent sucrose ranged from 13 to 22 percent. The average sucrose percentage was 19.6. A summary of sugar percentages and the range in yields by location is included in Table 3 in the Appendix.

PB-169 721 **Field 2B, 5C**
CFSTI Prices: HC$2.00 MF$0.50
North Dakota State Univ., Fargo. Dept. of Agricultural Economics.
FEASIBILITY OF COOPERATIVELY OWNED SLAUGHTERING PLANTS,
by Rex W. Cox and Fred R. Taylor. Jan 65, 44p
Agricultural economics rept. no. 39
Prepared in cooperation with Farmer Cooperative Service, USDA, Washington, D. C.

Descriptors: (*Economics, North Dakota), (*Beef, Industries), (*Agriculture, North Dakota), Feasibility studies, Commerce, Food, Management engineering, Costs, Labor, Bovines, Industrial plants, Distribution (Economics), Processing.

Identifiers: Area redevelopment.

It is doubtful that attempts should be made to organize cooperative slaughtering plants in North Dakota at the present time. The financial requirements are heavy, and the risks are large. Even though such endeavor is not advisable, it is not at all unlikely that such action will be appropriate in the future. How soon will depend largely on the supply of fed cattle of desired quality coming from both farm and commercial feedlots.

4. ATMOSPHERIC SCIENCES

NBS-TN-329 **Field 4A**
CFSTI Price: MF$0.50
Central Radio Propagation Lab., National Bureau of Standards, Boulder, Colo.
THE SEASONAL VARIATION OF NIGHTGLOW NaI 5890-96 A, (01) 5577 A AND (01) 6300 A IN THE TROPICS.
Technical note,
by L. L. Smith and R. W. Owen. 10 Jan 66, 49p

Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.35, as C13.46:329.

Descriptors: (*Night sky, Sky brightness), (*Sky brightness, Night sky), Periodic variations, Measure ment, Photometers, Hawaii.

Patent 3,229,937 **Field 4B, 22B**
SELF-OPENING NONPOROUS PARACHUTE.
Patent assigned to Navy,
by Salvatore J. Grillo and William B. Walker. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Drag parachutes, Sounding rockets), Patents, Radar reflectors, Automatic, Radiosondes.

The parachuteis used for retarding the descent of radiosonde equipment after release from an aircraft. The parachute is made of radar-reflective material and is ejected from a receptacle. The structure includes spring elements above the periphery of the canopy. The springs insure opening of the parachute after it is ejected from the receptacle.

PB-169 126 **Field 4B, 12B**
CFSTI Prices: HC$1.00 MF$0.50
Weather Bureau, Washington, D. C. Weather Analysis and Prediction Div.
PRESENT AND FUTURE OPERATIONAL NUMERICAL PREDICTION MODELS.
Notes to forecasters,
by Charles F. Roberts. Oct 65, 19p WB-TN-16-FCST-3

Descriptors: (*Mathematical models, Weather forecasting), (*Weather forecasting, Mathematical models), Numerical analysis.

For the past several years the output of the numerical prediction models has been transmitted on facsimile exactly as computed and traced by the data processing equipment. At present, the schedules at NMC preclude modification of machine predictions by the prognostic analyst, except for the surface where the machine forecast has serious flaws. The three-level baroclinic has been used in its present form for over two years, and its performance as well as its characteristic failings have been reported from time to time. The new 'Mesh' was introduced in January 1965. The purpose of this note is to acquaint field forecasters with the basic physical and mathematical structure of these and other models recently introduced or soon to be introduced as basic guidance from NMC. The new models include the Reed Surface 1000 mb. prediction model, (now transmitted on the Forecast Center Facsimile Network), the Shuman Primitive Equation Model and the SLYH Quantitative Precipitation Prediction Model. The Shuman Model is currently under test and should become operational in the winter of 1965-66.

PB-169 382 **Field 4B**
CFSTI Prices: HC$1.00 MF$0.50
National Meteorological Center, Weather Bureau, Washington, D. C.
SATURATION THICKNESS TABLES FOR THE DRY ADIABATIC, PSEUDO-ADIABATIC, AND STANDARD STMOSPHERES.
Technical memo.,
by Jerrold A. LaRue and Russell J. Younkin. Jan 66, 22p WB-TN-30-NMC-35

Descriptors: (*Humidity, Standards), Atmosphere, Water vapor, Tables, Meteorology.

The requirements for a complete moisture parameter include not only a measure of the degree of saturation but also a measure of the quantity of water vapor. 'Saturation Thickness' meets these two requirements when the thickness of the layer is also considered. The saturation thickness is defined as the hypothetical thickness required to produce saturation, given the moisture quantity and lapse rate of the layer. Tables of saturation thickness are given for the moist and dry adiabatic, and U. S. Standard Atmosphere lapse rates over a temperature range at 1000 mb. of -40C. to ;40C. The 1000-500-mb. layer has been divided into the three layer intervals corresponding to the standard radiosonde reporting levels. The tables should obviate the efforts of other investigators to derive this information. The significance of errors arising from assumptions and computational approximations is investigated in the Appendix. (Author)

PB-169 637 **Field 4B, 22B**
CFSTI Prices: HC$3.60 MF$0.50
Weapons Research Establishment, Salisbury (Australia).
BASIC ATMOSPHERIC PARAMETERS AS MEASURED BY FOUR FALLING SPHERE EXPERIMENTS AT WOOMERA, DECEMBER 1964-MARCH 1965,
by P. H. O. Pearson. Nov 65, 34p Technical note PAD-109

Descriptors: (*Atmospheric sounding, Falling bodies), (*Falling bodies, Atmospheric sounding), Australia, Meteorology, Sounding rockets.

A further four falling sphere experiments were conducted at Woomera from December, 1964 to March, 1965. These results complete the first full year of measurements in a series to investigate the seasonal variation on density, temperature, pressure and winds shortly after sunset. (Author)

PB-169 651 **Field 4B, 1C, 22B**
CFSTI Prices: HC$3.00 MF$0.75
Weather Bureau, Washington, D. C.
PROJECT STORM CLOUD: AN AIRCRAFT, SATELLITE CASE STUDY OF AN EAST COAST CYCLONE. PART I. DESCRIPTIVE ASPECTS.
Meteorological satellite laboratory report,
by E. Paul McClain and Linwood F. Whitney, Jr. Dec 65, 54p Rept. no. 35

Descriptors: (*Meteorological satellites, Hurricane tracking), (*Aircraft, Hurricane tracking), (*Hurricane tracking, Aircraft), (*Tropical cyclones, Tracking), Atlantic Ocean, Marine meteorology, Atmospheric sounding, Weather forecasting.

Identifiers: Storm cloud project.

Project Storm Cloud was designed to make extensive use of meteorological research aircraft and meteorological satellites in case studies of cyclones developing near the Atlantic Coast of the United States. Other data collections involving special pilot reports, rawinsonde flights, and radar scope photography were arranged for also. Full and integrated use of the standard and special meteorological observations is made to provide an unusually complete three-dimensional description of the cloud and weather structure of an East Coast storm in February of 1963. The satellite photographs enabled detection of, or drew attention to, many features of the storm system that would neither have been anticipated from synoptic models nor detected with conventional observations. Nearly simultaneous satellite photographs, aircraft time-lapse cine' film, and radar scope photographs enabled a synergistic approach to the synoptic meteorological analysis. The satellite pictures provided the broad-scale framework about which the other forms of data could be organized, as well as giving information about the nature of individual cloud systems and their relation to one another. The more restricted but highly detailed data provided by the research aircraft, on the other hand, enabled better interpretive use of the satellite pictures. (Author)

PB-169 652 **Field 4B, 22B**
CFSTI Prices: HC$1.00 MF$0.50
Chicago Univ., Ill. Dept. of the Geophysical Sciences.
EARLY STAGE OF TORNADO DEVELOPMENTS AS REVEALED BY SATELLITE PHOTOGRAPHS. CHAPTER IV OF A COMPREHENSIVE STUDY OF THE PALM SUNDAY TORNADOES, 1965.
Satellite and mesometeorology research project,
by Tetsuya Fujita. Jan 66, 19p SMRP Research paper-50
Grants Cwb-41, Cwb-34

Descriptors: (*Tornadoes, Aerial photography), (*Meteorological satellites, Tornadoes), Aerial photographs, Storms, Iowa, Air mass analysis, Meteorology, Weather forecasting.

Identifiers: TIROS.

About 20 min. after the first of a series of Palm Sunday tornadoes of April 11, 1965 formed in extreme eastern Iowa, TIROS IX, in northbound semi-polar Orbit No. 960, took pictures of the midwestern United States. Though the area of the tornado formation was too far from the exposure subpoint to be examined in detail, a vast region of southwesterly flow behind the cold front extending from Iowa to Arkansas was photographed with relatively small nadir angles of view. Of great interest was a faint, cirrus-like streak inside a large clear area behind the front, which, it was concluded, was a dust storm limiting visibility to less than two miles in some areas. Thermodynamical structure of the dry cold in which the dust storm was embedded will be discussed in detail in connection with its role in giving rise to the development of the Palm Sunday tornadoes. (Author)

PB-169 655 **Field 4B, 22B**
CFSTI Prices: HC$4.00 MF$1.00
Florida State Univ., Tallahassee. Dept. of Meteorology.
THE DISTRIBUTION AND DEPTH OF CONVECTIVE CLOUDS OVER THE TROPICAL ATLANTIC OCEAN, DETERMINED FROM METEOROLOGICAL SATELLITE AND OTHER DATA.
Final rept.,
by Edward J. Zipser and N. E. LaSeur. Dec 65, 134p
Grant Cwb-WBG-36

Descriptors: (*Marine meteorology, Atlantic Ocean), (*Atlantic Ocean, Marine meteorology), (*Clouds, Atlantic Ocean), Tropical regions, Convection (Atmospheric), Cloud cover, Aerial photography, Meteorological satellites.

Identifiers: TIROS, Convective clouds.

Over the portion of the tropical Atlantic near and east of the Lesser Antilles, a large sample of airborne time-lapse motion pictures was obtained during the wet season of 1963, much of it nearly synchronous in time and space with TIROS satellite coverage. Chief attention is given to the regimes containing mostly convective clouds, which prove to occupy a large majority of the total area. A close relationship is found between the depth of the convective layer and the brightness of the individual TIROS cloud units. Factors which must be considered in making brightness estimates are discussed. Differences in gray scale depiction between satellite systems are noted, suggesting that extension of these findings to other systems, although possible, be made with caution. Mesoscale patterning of tropical oceanic convection is shown to be extremely common, and usually observable from satellite photographs of the quality of those of TIROS VII, but sometimes only marginally so. Some determinations of per cent areal coverage by convective clouds are made, which suggest that estimates based upon surface ship observations may be systematically high. Procedures are suggested for making more accurate and extensive determinations in future work. (Author)

PB-169 667 **Field 4A**
CFSTI Prices: HC$5.60 MF$0.50
Avco Corp., Wilmington, Mass. Research and Development Div.
AN INVESTIGATION OF SUMMER EVENING INCREASES OF F LAYER ELECTRON DENSITY IN THE REGION OF THE ANTARCTIC PENINSULA.
Antarctic research and data analysis scientific rept.,
by Gerald F. Rourke. 29 Mar 66, 53p Technical rept. no. 22
Contract NSF-C403
RAD TR-66-11

Descriptors: (*Ionosphere, Electron density), (*Electron density, Ionosphere), Twilight, Antarctic regions, Atmospheric sounding, Geophysics.

Identifiers: F layer, Alouette.

PB-169 689 **Field 4B, 22B, 14E**
CFSTI Prices: HC$3.00 MF$0.75
Massachusetts Inst. of Tech., Cambridge. Dept. of Meteorology.
LARGE-SCALE VERTICAL MOTION AND SATELLITE CLOUD PHOTOGRAPHS.
Final rept.,
by Frederick Sanders. Dec 65, 91p
Contract Cwb-10843

Descriptors: (*Meteorological satellites, Aerial photography), (*Aerial photographs, Clouds), (*Clouds, Atmospheric motion), Cloud cover, Meteorological charts, Mathematical models.

Identifiers: TIROS.

TIROS cloud photographs and fine-scale quasi-geostrophic calculations of vertical motion are used in an attempt to gain understanding of the evolution of large-scale cloud masses and to explore the usefulness of the pictures in diagnosis of the vertical motions. Horizontal and vertical motions are found to be of roughly equal importance in the

evolution of cloud patterns, except in the early phases of the storm, when the latter predominates. Thus this diagnostic application of the pictures is limited, but the evolution of cloud patterns is nicely accounted for. Cloud vortices occur in a variety of large-scale motion environments and seem to depend on fine-scale variations of motion and moisture structure which escape detection in conventional sounding networks. A cloud vortex is a sufficient but not a necessary criterion for nearby coexistence of a closed circulation or vorticity maximum throughout a substantial depth of the troposphere. Quasi-geostrophic theory yields at least qualitatively realistic vertical motions even in application to systems of smaller scale than can be justified a priori. (Author)

PB-169 809 **Field 4B, 12A**
CFSTI Prices: HC$1.60 MF$0.50
Weather Bureau, Washington, D. C.
AN EXPERIMENT IN PROBABILITY PRECIPITATION FORECASTING.
Eastern region note (Technical),
by Glenn Stallard. Oct 65, 17p WBTN-19-ER-1

Descriptors: (*Atmospheric precipitation, Weather forecasting), (*Weather forecasting, Atmospheric precipitation), (*Probability, Weather forecasting), Feasibility studies.

The experiment would seem to indicate that an experienced forecaster can make subjective probability forecasts as successfully as he can make categorical forecasts. It is further concluded that (1) Reliable subjective probability forecasts can be made at 10 percent intervals up to 36 hr. (2) For periods beyond 36 hr, the average forecaster cannot distinguish probabilities within a plus or minus 10 percent in the range from 40 percent to 100 percent. (3) Resolution is inherently poor for probability forecasts verified at only one point.

PB-169 811 **Field 4B, 17I**
CFSTI Prices: HC$1.00 MF$0.50
Weather Bureau, Washington, D. C.
A COMPARISON OF HURRICANE CENTER FIXES MADE BY LAND BASED RADAR AND RECONNAISSANCE AIRCRAFT.
Radar note (Technical),
by Charles R. Holliday. Jan 66, 23p WBTN-31-RADAR-1

Descriptors: (*Hurricane tracking, Effectiveness), (*Meteorological radar, Hurricane tracking), (*Reconnaissance planes, Hurricane tracking), Tropical cyclones, Radar stations, Airborne, Errors, Ranges (Distance).

Reconnaissance aircraft center fixes for seven hurricanes are compared with a best-fit radar track constructed from center fixes obtained by coastal radars. Results of the comparison indicate that differences of the magnitude of 15 n.mi. are not uncommon and, at times, may well exceed this value. Suggestions are made of the causes of these deviations between the radar best-fit track and aircraft center fixes (both radar and penetration) for each storm. (Author)

PB-169 812 **Field 4B, 14B**
CFSTI Prices: HC$1.60 MF$0.50
Weather Bureau, Washington, D. C.
SHORT RANGE MINIMUM TEMPERATURE FORECASTING WITH THE ECONOMICAL RADIOMETER.
Western region note (Technical),
by Earl M. Bates and Keith E. Phillips. Jan 66, 12p WBTN-32-WR-5

Descriptors: (*Atmospheric temperature, Weather forecasting), (*Radiometers, Weather forecasting), Feasibility studies, Agriculture, Meteorological instruments, Cooling, Surface temperature, Statistical analysis, Experimental data.

A radiating device to indicate the amount of cooling to be expected of surface objects on a particular night and calibrated to indicate the temperature of the cool surface in degrees F. was exposed to the sky on clear evenings at Walla Walla, Wash. A record of the resulting temperatures was kept and a record was kept of eight variables which were believed to influence nighttime radiation. A step-wise linear regression was performed with the eight variables to determine how they influenced the variance of the radiometer's reading from the true minimum. Results of the regression are shown in tabular form, with all eight variables explaining 31 percent of the variance of the temperature change from night to morning. Only two of the variables, air temperature and sunset sky cover, proved to be significantly influential; however, the study indicates that the radiometer may be useful as an aid in minimum temperature forecasting. Further study with this instrument is desirable as no test was conducted on independent data. (Author)

5. BEHAVIORAL AND SOCIAL SCIENCES

AD-420 503 **Field 5B**
CFSTI Price: HC$2.60
Armed Services Technical Information Agency, Arlington, Va.
PRACTICAL ASPECTS CONCERNING THE DEVELOPMENT AND USE OF ASTIA'S THESAURUS IN INFORMATION RETRIEVAL,
by J. F. Caponio and T. L. Gillum. 14 Sep 62, 22p
Prepared for presentation at Division of Chemical Literature, American Chemical Society, Atlantic City, N. J. meeting, September 9-14, 1962.

Descriptors: (*Vocabulary, Documentation), (*Docu mentation, Vocabulary), (*Information retrieval, Vocabulary), Data processing systems, Display systems, Indexes, Dictionaries, Subject indexing, Scientific research.

Identifiers: THESAURI.

The paper presents a detailed description of the nature of ASTIA's report literature control problem and the evaluation of a mechanized system for storage and retrieval of document references pertaining to science, technology, and medicine. The application of the thesaurus concept for control of an indexing vocabulary is related and the revision of the First Edition of the Thesaurus of ASTIA Descriptors is explained. Problems arising from efforts to evaluate terminology and indicate relationships among selected descriptors are discussed in terms of the broad principles derived. Emphasis is placed on the importance of the human element in a mechanized information retrieval system.

AD-420 504 **Field 5B**
CFSTI Price: HC$1.10
Armed Services Technical Information Agency, Arlington, Va.
COMPILING A TECHNICAL THESAURUS,
by T. L. Gillum. 14 Jan 63, 14p

Descriptors: (*Vocabulary, Documentation), (*Docu mentation, Vocabulary), (*Information retrieval, Vocabulary), Display systems, Indexes, Dictionaries, Standards, Subject indexing.

Identifiers: Thesauri.

A thesaurus is defined as a device for controlling and displaying an indexing vocabulary. The vocabulary is controlled in the sense that the individual terms are carefully chosen and appear as distinct, though not inseparable, entities; it is displayed in such a way as to provide ready access from a given entry to related words that may be needed to index a paper or phrase a search question. Some factors that may be considered in formulating the vocabulary for the thesaurus are discussed in terms of experience in compiling The Thesaurus of ASTIA Descriptors. Among the basic criteria to be examined are (1) the volume and scope, in terms of scientific disciplines involved, of the collection to be indexed, (2) the technical competence of those indexing and retrieving the information, (3) the resources, including time, money, and equipment, to be devoted to the retrieval system as a whole and (4) the demands, in terms specificity of information, and speed of service that must be satisfied by the system. Problems that must be dealt with in evaluating the individual terms include (1) synonyms, (2) homographs, (3) generic relationships, (4) logical relationships and (5) proper degree of specificity. Effective display of the vocabulary encompasses format of cross references, methods of delimiting meanings of terms, and graphic displays of related terms. (Author)

AD-442 042 **Field 5D, 5K**
CFSTI Price: HC$5.60
Rand Corp., Santa Monica, Calif.
CERTAIN EFFECTS OF CULTURE AND SOCIAL ORGANIZATION ON INTERNAL SECURITY IN THAILAND,
by H. P. Phillips and D. A. Wilson. Jun 64, 57p RM-3786-ARPA (Abridged)

Descriptors: (*Thailand, Political science), (*Political science, Thailand), (*Sociology, Thailand), Culture, Social psychology, Communism, Government (Foreign).

The basic assumption of this Memorandum is that modifications in Thai society aimed at strengthening internal security are likely to be the more effective the more fully they take into account the motivations and attitudes of the Thai people and the functioning of Thai institutions. Because of the nebulous character of the communist threat as it is perceived at the local level, the justification and usefulness of any future security measures should not be limited to that threat; a straight anticommunist approach is unlikely to engage the average villager's interest and co-operation. On the other hand, a program that satisfies some of his existing needs -- by traditional means, wherever possible -- promises success.

AD-442 338 **Field 5B, 5G, 9B**
CFSTI Price: HC$6.60
Astro-Electronics Div., Radio Corp. of America, Princeton, N. J.
AUTOMATIC SYNTAX ANALYSIS,
Feb 61, 67p Rept. no. SR-60-2
Contract DA-49-083-OSA-1183

Descriptors: (*Information retrieval, Automatic), (*Syntax, Analysis), Language, Subject indexing, Abstracts, Programming (Computers), Programming languages, Processing.

Identifiers: ACSI-matic Project.

This report describes in detail the Automatic Syntax Analysis program developed by the ACSI-MATIC language Control Group for the RCA 501 computer. This program is a working tool which will be useful in many language control and analysis studies, for example, document indexing, condensing or abstracting, and, hopefully, information extraction. These applications are of great importance to the ACSI-MATIC system. It is an important tool which will aid in the generation of a collation language and a descriptive language for information retrieval. The report is divided into three sections and five appendices. The first section presents the background and introductory ideas for the computer program. The second section is a description of the program itself, including many of the details. The third section presents two typical applications, namely auto-abstracting and document condensation. (Author)

NBS-Miscellaneous Pub-258 **Field 5G, 5B**
CFSTI Prices: HC$1.25 MF$1.00
National Bureau of Standards, Washington, D. C.

FOREIGN-LANGUAGE AND ENGLISH DICTIONARIES IN THE PHYSICAL SCIENCES AND ENGINEERING: A SELECTED BIBLIOGRAPHY 1952 TO 1963,
by Tibor W. Marton. 24 Jul 64, 195p
Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, $1.25, as C13.10:258.

Descriptors: (*Dictionaries, Bibliographies), (*Languages, Dictionaries), Physics, Engineering, Vocabulary, Documentation.

The bibliography lists over 2800 unilingual, bilingual, and polyglot dictionaries, glossaries and encyclopedias in the physical sciences, engineering and technology published during the past twelve years. The majority of the titles cited have English as the xource or target language, or are dictionaries giving definitions in English. The bibliographic entries are arranged in 49 subject classes; within each subject, the entries are listed alphabetically by language, and within each language group by author. Forty-seven foreign languages are represented in the compilation. Lists of abbreviations and reference sources, and detailed author, language, and subject indexes complement the publication. (Author)

PB-168 750 **Field 5A**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
PREDICTABILITY OF THE COSTS, TIME, AND SUCCESS OF DEVELOPMENT.
Revised ed.,
by A. W. Marshall and W. H. Meckling. 11 Dec 59, 25p P-1821
AD 224 160
Revision of manuscript submitted 14 Oct 59.

Descriptors: (*Management planning, Scientific research), (*Scientific research, Management planning), Air force research, Research program administration.

PB-169 252 **Field 5G**
CFSTI Prices: HC$6.00 MF$1.50
Harvard Univ., Cambridge, Mass. Computation Lab.
MATHEMATICAL LINGUISTICS AND AUTOMATIC TRANSLATION,
by Anthony G. Oettinger. Dec 65, 285p
NSF 16
Document includes On the Nature of Syntactic Irregularity, by George Lakoff.

Descriptors: (*Computational linguistics, Machine translation), (*Machine translation, Computational linguistics), Grammars, Syntax, Mathematical logic.

Within the context of the conception of grammar given in Noam Chomsky's 'Aspects of the Theory of Syntax', the author attempts to characterize the notion 'exception to a rule of grammar.' He shows that this notion depends on a prior notion of 'rule government:' In each phrase marker on which a transformational rule may operate, there exists one lexical item which governs that rule; only that item may be an exception to the rule. There are two types of transformational rules: major and minor. Major rules apply in normal cases, but do not apply to exceptions. Minor rules apply only to exceptions, but do not apply in normal cases. These are simple excptions. There are also absolute exceptions, lexical items which must, or must not, meet the structural description of some transformational rule. He assumes that each lexical item is subcategorized with respect to each transformational rule and each structural description. He calls these categories rule features and structural description features. Some lexical items must be represented with Boolean functions of these. Thus, each grammar may be said to define the set of possible exceptions to its rules. (Author)

PB-169 439 **Field 5E, 1D**
CFSTI Price: HC$1.10
School of Aviation Medicine, Randolph AFB., Tex.
LEGIBILITY OF AIRCRAFT INSTRUMENT DIALS: A FURTHER INVESTIGATION OF THE RELATIVE LEGIBILITY OF TACHOMETER DIALS,
by Roger Brown Loucks. 27 Oct 44, 8p Rept. no. 2
Proj. 265
AD 132 973

Descriptors: (*Instrument dials, Human engineering), (*Tachometers, Instrument dials), (*Human engineering, Instrument dials), Design, Visibility, Thickness, Ultra violet radiation, Illumination, Scale, Display systems, Flight instruments.

A tachometer dial which has division figures 3/16ths of an inch by 1/32nd of an inch proves, in general, to be as legible as dials with much thicker and larger numbers. This finding requires some qualification in that the large figures apparently caused some difficulty because their overall width made it difficult to select the particular division mark with which each number was associated. Had it been possible to construct dials with a different style of number in which the ratio of the height to the overall width was greater, the larger figures might conceivably have been superior. It should also be noted that such differences in legibility as were found to exist with ultraviolet light cannot be assumed to apply to a situation where the level of illumination permits an optimal degree of dark adaptation. It is recommended that authorization be granted to obtain the facilities for procuring dials which have numbers with various height to width ratios, and the orange type of fluorescent paint. (Author)

PB-169 557 **Field 5B**
CFSTI Prices: HC$1.60 MF$0.50
Low Temperature Research Station, Cambridge (England).
INFORMATION HANDLING IN A LARGE INFORMATION SYSTEM,
by P. R. P. Claridge. 1957, 19p
Preprints of papers for the International Conference on Scientific Information, Washington, D. C. Nov 16-21 1958, Area 5, p377-94.

Descriptors: (*Information retrieval, Biochemistry), (*Indexing, Biochemistry), (*Classification, Biochemistry), Chemical compounds, Plants (Botany), Technical information centers, Punched tape, Symposia, Docu mentation, Programming (Computers).

PB-169 596 **Field 5B, 14A, 12B**
CFSTI Prices: HC$6.00 MF$1.25
Information Dynamics Corp., Wakefield, Mass.
INFORMATION SERVICE SYSTEM MODELING. ANALYTICAL TOOLS FOR MANAGEMENT EVALUATION.
Final rept.,
by Mark Chodrow, David E. Sparks, and David P. Waite. Dec 63, 253p R-1061-4
Contract NSF-C623

Descriptors: (*Information retrieval, Cost effectiveness), (*Management planning, Information retrieval), (*Operations research, Information retrieval), (*Systems engineering, Information retrieval), Communication systems, Data trans mission systems, Networks, Data processing systems, Value engineering, Mathematical models, Flow charting, Management engineering.

The problem of analyzing operating costs of information service networks by employing mathematical modeling techniques is discussed. As a result of this work, it is now possible to evaluate alternative network configurations on the basis of operating costs. The model developed permits representation of the multitude of variables of subject disciplines, geographic location, communications, the variety of existing forms of input information, the type and location of information processing operations, and many others. This report is presented in two parts: Part I provides an interpretive report to management on the objectives, results, conclusions, and utility of the mathematical model created to represent and evaluate the operating costs. The development of the model and an illustrative calculation are reported in technical detail in Part II. (Author)

PB-169 597 **Field 5B, 5D**
CFSTI Prices: HC$1.10 MF$0.50
Pittsburgh Univ., Pa.
APPLICATION OF INFORMATION RETRIEVAL TECHNIQUES TO LEGAL RESEARCH,
by John F. Horty. 1 Nov 60, 9p

Descriptors: (*Information retrieval, Law), (*Law, Information retrieval), Data storage systems, Search theory, Digital computers, State-of-the-art reviews.

Identifiers: IBM 7070.

PB-169 599 **Field 5B, 9B**
CFSTI Prices: HC$2.60 MF$0.50
Stanford Research Inst., Menlo Park, Calif.
BIBLIOGRAPHY ON THE MECHANIZATION OF INFORMATION RETRIEVAL: SUPPLEMENT III,
by Charles P. Bourne. 1 Feb 61, 27p
NSF Scientific documentation project. See also PB-169 601.

Descriptors: (*Information retrieval, Bibliographies), (*Bibliographies, Information retrieval), Automation.

PB-169 601 **Field 5B, 9B**
CFSTI Prices: HC$1.60 MF$0.50
Stanford Research Inst., Menlo Park, Calif.
BIBLIOGRAPHY ON THE MECHANIZATION OF INFORMATION RETRIEVAL: SUPPLEMENT II,
by Charles P. Bourne. 1 Feb 60, 14p
See also PB-167 377, PB-167 378. NSF Scientific documentation project.

Descriptors: (*Information retrieval, Bibliographies), (*Bibliographies, Information retrieval), Automation.

This supplement includes some of the technical papers and report literature that have appeared since the last supplement, or which have been overlooked by both of the proceeding reports.

PB-169 602 **Field 5G**
CFSTI Prices: HC$1.10 MF$0.50
Lear Siegler, Inc., Santa Monica, Calif.
THE NATURE OF HUMAN COMMUNICATION,
by E. Mark Gold. 1962, 6p
NSF Scientific Documentation Project.

Descriptors: (*Social communication, Theory), (*Linguistics, Theory), Semantics, Language, Sensory perception.

PB-169 604 **Field 5B, 9B**
CFSTI Prices: HC$1.10 MF$0.50
Western Reserve Univ., Cleveland, Ohio. Center for Documentation and Communication Research.
MACHINE SEARCHING OF METALLURGICAL LITERATURE,
by Allen Kent, Robert E. Booth, and J. W. Perry. 1957, 6p
Reprinted from Metal Progress Feb. 1957.

Descriptors: (*Metallurgy, Information retrieval), (*Information retrieval, Metallurgy), Abstracts, Periodicals, Computers, Programming

(Computers), Technical information centers, Subject indexing.

Identifiers: American Society for Metals.

The ASM research project, only a year old, has already formulated a coding system adaptable to machine feed for various commercial computers and electronic selectors, and several thousand metallurgical abstracts have already been encoded and trial runs made on equipment constructed at Western Reserve University. (Author)

PB-169 613 **Field 5J, 6P**
CFSTI Prices: HC$1.10 MF$0.50
University Coll., London (England).
AN ASPECT OF THE PERCEPTION OF PITCH,
by A. J. Fourcin. 1961. 5p
Proceedings of the International Congress of Phonetic Sciences (4th), Helsinki 1961.

Descriptors: (*Pitch discrimination, Auditory perception), (*Auditory perception, Pitch discrimination), Sound pitch, Speech recognition, Psychoacoustics, Ear.

Although the pitch of voiced sounds is perhaps one of the most readily perceived of their subjective attributes, the satisfactory laboratory determination of a physical correlate presents great difficulty. The basic problems of experimental speech analysis are essentially also those of perception and if more were known of the processes in the hearing mechanism which underlie the perception of pitch the instrumentation requirements could be more accurately defined. The present work relates only to a small part of this large subject and is especially concerned with a particular aspect of a possible neural mechanism for the mediation of pitch.

PB-169 623 **Field 5G, 5J**
CFSTI Prices: HC$1.10 MF$0.50
Lear Siegler, Inc., Santa Monica, Calif.
FORMAL FOUNDATIONS OF THINKING. STATUS REPORT NO 1: LINGUISTICS.
by E. Mark Gold. 10 Jul 63, 7p
NSF Scientific documentation project.

Descriptors: (*Reasoning, Theory), (*Linguistics, Reasoning), Problem solving, Mathematical logic, Algorithms.

PB-169 624 **Field 5K**
CFSTI Prices: HC$1.10 MF$0.50
Warsaw Univ. (Poland).
A SIMPLE MODEL OF THE FUNCTIONING OF PUBLIC OPINION.
by Olgierd Wojtasiewicz. 1964. 6p
Studia Logica v15 1964. NSF Scientific Documentation Project.

Descriptors: (*Public opinion, Mathematical models), Reasoning, Simulation, Decision making.

PB-169 627 **Field 5E, 5J**
CFSTI Price: HC$1.10
Human Engineering Lab., Aberdeen Proving Ground, Md.
EFFECTIVENESS OF WARNING LIGHTS AS A FUNCTION OF FLASH RATE,
by Leon R. Katchmar and Nathan H. Azrin. 15 Aug 56, 10p TB1-1000, Technical memo TM-23
AD 107 279

Descriptors: (*Light pulses, Warning systems), (*Reaction (Psychology), Light pulses), (*Warning systems, Human engineering), Frequency, Effectiveness, Visual signals, Signal lights.

This paper investigated the extent to which changes in flash frequency would change the effectiveness of a warning light in eliciting a reaction. Ten subjects were required to judge which flashing light they would turn off first. It was found that the effectiveness of the warning light increased as a direct function of the flash rate, reaching maximal effectiveness at approximately 10 cps. Further increases in frequency produced a decrease in effectiveness. There is some evidence to indicate that effectiveness, apparent fluctuations, and disagreeableness all vary in the same way as a function of flash rate. (Author)

PB-169 666 **Field 5D**
CFSTI Price: HC$5.60
RAND Corp., Santa Monica, Calif.
THE CHINESE COMMUNIST LINE ON NEUTRALISM,
by A. M. Halpern. 19 Nov 60. 54p RM-2657
Contract AF 49(638)-700
AD 253 001
Microfilm available from DDC.

Descriptors: (*China, Foreign policy), (*Political science, China), Communism, Yugoslavia, USSR, South Asia, Asia, Symposia.

The paper, prepared for presentation at the Third International Conference of Sovietologists and Sinologists, which was held in Japan in September, 1960, advances a set of hypotheses concerning the utilization of appeals to Asian neutralism as an element in Communist China's foreign policy. The hypotheses are limited to the period November, 1957-December, 1960.

PB-169 675 **Field 5B**
CFSTI Prices: HC$3.60 MF$0.50
Western Research Univ., Cleveland, Ohio. Center for Documentation and Communication Research.
IDENTIFICATION OF SOURCES OF EDUCATIONAL RESEARCH MATERIALS.
Staff rept.
1963. 32p Cooperative Research-1517

Descriptors: (*Documentation, Sources), (*Education, Scientific research), (*Social sciences, Documentation), Selection, Identification, Psychology, Management planning, Sociology, Information retrieval.

Based upon previous observations and conclusions, both by the Center and by others, and within the limits of the funding of this particular study, the objectives may be defined as follows. (1) To assess the value of various approaches to the identification and acquisition of educational research materials. (2) To assess the value of present procedures. (3) To present a list of periodicals, grouped according to estimated yearly yield so that decisions can be made to subscribe or to scan regularly. (4) To present a representative list of source materials useful in developing the program to date. (5) To offer specific suggestions for the establishment of an active identification and acquisition program.

PB-169 676 **Field 5B, 9B**
CFSTI Prices: HC$7.60 MF$0.75
Information Dynamics Corp., Wakefield, Mass.
OUTPUT PRINTING FOR LIBRARY MECHANIZATION.
State of the art paper.
by David E. Sparks, Lawrence H. Berul, and David P. Waite. 1963. 76p
Sponsored by NSF, Library of Congress, and the Council or Library Resources, Inc. NSF scientific documentation project. One of a group of papers presented at Conf. on Libraries and Automation. Airlie Foundation, Warrenton, Va. 26-30 May 63.

Descriptors: (*Libraries, Printing), (*Printing, Libraries), Automation, Punched tape, Cameras, Copying cameras, Input-output devices, Programming (Computers), Automatic, Photographic techniques, Indexes, Typewriters.

Identifiers: Photocomposition, PHOTON, Library of Congress, Scientific and Technical Aerospace Reports.

CONTENTS: Products for library output printing. Aspects of library output printing (characteristics of library publications, production aspects of output printing, technical aspects of output printing, automation aspects of output printing). Output printing equipment (paper-tape-operated composing machines, sequential card cameras, high-speed computer output printers). Programming and systems considerations (input preparation, input code conversion, input processing, alphabetization, automatic hyphenation and justification, output formatting, typographic functional codes, output code conversion). The integrated systems approach. (Reproduced in 'Libraries and Automation'. Washington, D. C., Library of Congress, 1964, 268p.)

PB-169 691 **Field 5B**
CFSTI Prices: HC$2.00 MF$0.50
West Virginia Univ., Morgantown. Library.
THE DEVELOPMENT OF BIBLIOGRAPHIC CENTER IN THE WEST VIRGINIA REGION.
Final rept. (preliminary ed.),
by Lorise C. Boger. 1966. 31p

Descriptors: (*Libraries, West Virginia), Bibliographies, Information retrieval, Universities.

This, the third and final report on an experiment in bibliographic centralization and cooperation, is a summary of results achieved in a three-and-a-half year period. The project was supported by West Virginia University and the National Science Foundation. The report is an analysis of the efforts of the librarians at the West Virginia University Library and in the libraries throughout the state to communicate and to put to the best possible use the bibliographic facilities and talents available in the region.

PB-169 693 **Field 5G**
CFSTI Prices: HC$1.60 MF$0.50
Itek Corp., Lexington, Mass.
PREPOSITIONAL CONSTRUCTIONS: STRUCTURAL DELIMITATIONS.
by Milos Pacak. 1964. 19p
Prepared for presentation at Annual Meeting of AMTCM, Bloomington, Ind., 1964.

Descriptors: (*Russian language, Syntax), Computational linguistics, Machine translation, English language.

Identifiers: Prepositions, Morphology, Strings (Linguistics).

Conclusions: The class of prepositions and its subclasses which exhibit certain morphosyntactic properties can be replaced by a class of elements the morphosyntactic properties of which are identical with those of prepositions. For example, the formation rules which are valid for a subclass of prepositions governing the dative will also be valid for the subclass of adjectivals of the type 'ROVNYJ' (equal) and subclass of verbs of the type 'UDIVIT6S4' (to be astonished). The procedure for the structural delimitation of prepositional constructions is applicable to other Slavic languages. The tentative rules for the transformation of discontinuous sequences into continuous sequences in Russian will rearrange the original word order in such a way that the new word order will correspond basically to an acceptable sequence in English. The procedure described can be used for automatic abstraction of certain types of structures in any type of discourse. (Author)

PB-169 700 **Field 5C**
CFSTI Prices: HC$3.00 MF$0.75
Oklahoma Univ., Norman. Bureau of Business Research.
THE ECONOMIC FEASIBILITY OF A TRAVEL SERVICE CENTER IN HENRYETTA, OKLAHOMA.
Jun 63, 78p
Contract Cc-5919

Descriptors: (*Traffic, Economics), (*Economics, Oklahoma), (*Commerce, Oklahoma), Roads, Trans portation, Feasibility study.

A travel center located near Henryetta, Oklahoma, is not only economically feasible but is also essential if the town is to capitalize on the increased travel in the area. The flow of automobile traffic in the area will grow and will result in greater expenditures by travelers. However, facilities must be provided in the vicinity of Henryetta and near the new highways if this spending is to benefit the merchants and residents of Henryetta. To be of maximum benefit to the community, this travel center should include the following types of establishments: (a) Motel (b) Restaurant (c) Filling Station and Garage and Car Wash (d) Boat Sales, Service, and Storage Facility (e) Sporting Goods Store (f) Drive-In Grocery (g) Beauty Shop (h) Truck Sales, Service, and Terminal Operation (i) Souvenir, Gift and Antique Shop (j) Drive-In Restaurant (k) Car Rental Service.

PB-169 703 **Field 5C, 13D**
CFSTI Prices: HC$2.00 MF$0.50
Oklahoma Univ., Norman. Bureau of Business Research.
THE ECONOMIC FEASIBILITY OF A REPROCESSING METAL CONTAINERS PLANT IN OKMULGEE, OKLAHOMA.
Jun 63, 38p
Contract Cc-5913

Descriptors: (*Economics, Oklahoma), (*Industrial plants, Oklahoma), (*Containers, Processing), Feas ibility studies, Commerce, Manufacturing methods, Industrial equipment, Industries, Metals.

This study was to determine the economic feasibility of a plant to be located in Okmulgee, Oklahoma, for reprocessing metal drums. The profitability, employment, availability of used drums, and long range outlook of the proposed plant are the factors upon which its desirability depends. The study shows that the proposed plant is economically feasible. The consumption of reprocessed metal drums in the area which can be served by the plant has increased from 3.8 million barrels in 1939 to 10.0 million barrels in 1961. It is expected to reach 19.2 million barrels in 1975. More than half the reprocessed drums in the area around the proposed plant are supplied from beyond its boundaries, which offers a competitive advantage. There are ample supplies of drums and labor for the proposed plant. It will require $250,000 to build the plant and get it into operation. The proposed plant can make a profit of $88,691, or 6.9 per cent of sales in its initial year, and even better in subsequent years. It is the conclusion of the study that the plant is feasible. It will provide 40 jobs and a sizeable payroll for the area. The projected growth of the area indicates that the plant will be a stable influence on the economy of the area.

PB-169 704 **Field 5C, 11L**
CFSTI Prices: HC$3.00 MF$0.50
Gram Development Co., Portland, Oreg.
ECONOMIC FEASIBILITY OF UTILIZING LOGGING RESIDUES IN SELECTED WASHINGTON COUNTIES.
Final rept.,
by Thomas A. McKenzie and H. B. Gram. 8 Jan 64, 56p
Contract Cc-6093

Descriptors: (*Wood, Industries), (*Economics, Washington), Manufacturing methods, Natural resources, Forestry, Feasibility studies, Costs.

Western Washington State is an important lumber, plywood, and pulp producing region. Five counties in Western Washington were selected as areas that could probably benefit from a study of the economics of utilizing logging residues. Within the five counties selected, four local study areas were examined as possible situations in which to develop an independent business to utilize logging residues. Ownership patterns, transportation networks, the industrial integration of existing industries, and the current volume of logging residues are generally covered area by area. In the area offering the best combination of factors, a cost analysis of several processes to utilize logging residues is presented. A fundamental recommendation of this report is that all parties dealing with a new logging residue business must want such a new venture to succeed. If buyers and sellers, in addition to the new manufacturer, recognize the benefits of such conservation, then we are confident that a business designed to utilize logging residues can succeed.

PB-169 708 **Field 5C, 11L**
CFSTI Prices: HC$3.00 MF$0.50
Oklahoma Univ., Norman. Bureau of Business Research.
THE ECONOMIC FEASIBILITY OF A WOOD ALCOHOL-CHARCOAL MANUFACTURING PLANT IN LATIMER COUNTY, OKLAHOMA.
Jan 65, 54p
Contract CC-6031

Descriptors: (*Methanols, Industries), (*Charcoal, Industries), (*Economics, Oklahoma), (*Oklahoma, Industries), Wood, Feasibility studies, Industrial plants.

Identifiers: Wood alcohol.

This study was made to determine the economic feasibility of a wood alcohol-charcoal manufacturing plant to be located in Latimer County, Oklahoma. In order to attain this objective, the profitability, employment, resource utilization, and long range outlook of the proposed plant were scrutinized. On the basis of the findings of this study it is recommended that neither the integrated plant nor the charcoal plant be established since markets for these products either do not exist or are already over supplied.

PB-169 709 **Field 5C**
CFSTI Prices: HC$1.00 MF$0.50
Herkenhoff (Gordon) and Associates, Albuquerque, N. Mex.
STATE OF NEW MEXICO DEVELOPMENT PLAN OF RECREATION FACILITIES FOR STORRIE LAKE STATE PARK.
May 65, 13p
Contract Cc-6123
Prepared in cooperation with Dept. of Commerce, Washington, D. C. Area Redevelopment Admin., Technical Assistance Project.

Descriptors: (*Economics, New Mexico), (*Recreation, Economics), Commerce, Natural resources.

Identifiers: Area redevelopment.

A preliminary investigation and economic analysis pertinent to the development of Storrie Lake was completed and a comprehensive report constituting Phase I of the contract was submitted to the Area Redevelopment Administration in June 1964. After reviewing the Phase I Report the Area Redevelopment Administration directed that the Phase II portion not be undertaken, since the preliminary report indicated that only two seasonal and two permanent jobs would be created. All facilities enumerated will eventually be constructed. Scheduling of such construction will be dependent on availability of funds and on the magnitude of use experienced at the Lake. It is apparent that with the addition of modern sanitary facilities the existing picnic ground development is adequate to serve the relatively high volume of local use. Camp-ground development should be accomplished to provide accommodations for overnight use by other than local patrons. First class campground facilities will undoubtedly induce an increase in patronage from outside the immediate area. We recommend that the campground development, with water and sanitary facilities, be accomplished at the earliest possible date.

PB-169 714 **Field 5C, 6H**
CFSTI Prices: HC$6.00 MF$1.25
New Bedford Inst. of Tech., Mass. Research Foundation.
A TECHNICAL STUDY OF THE SCALLOP AND FLOUNDER INDUSTRY OF NEW BEDFORD, MASSACHUSETTS.
1963, 207p

Descriptors: (*Economics, Massachusetts), (*Seafood, Industries), (*Industries, Massachusetts), Processing, Fishes, Ships, Management engineering, Personnel, Marine engineering, Commerce.

Identifiers: Area redevelopment.

This report deals with the operational problems confronting the fishing industry in the City of New Bedford. Special attention was given to the personnel engaged in the industry, both those who work aboard the vessels and those who are engaged in shore facilities. Discussed in detail are the vessels, equipment, sanitation, insurance and conservation of product. Vessel construction and sources of supply are also an integral part of the report. The problems affecting the product, in regards to geographical location, and the processing of the product, are dealt with in detail. Recommendations regarding all of the above elements have been incorporated into this report for further action for the benefit of the fishing industry in general. (Author)

PB-169 715 **Field 5C**
CFSTI Prices: HC$3.00 MF$0.75
Herkenhoff (Gordon) and Associates, Albuquerque, N. Mex.
STATE OF NEW MEXICO DEVELOPMENT PLAN OF RECREATION FACILITIES FOR CONCHAS LAKE AND UTE LAKE STATE PARKS.
May 65, 93p
Contract Cc-6123
Prepared in cooperation with Dept. of Commerce, Washington, D. C. Area Redevelopment Admin., Technical Assistance Project.

Descriptors: (*Economics, New Mexico), (*Recreation, Economics), Commerce, Natural resources, Lakes, Dams.

Identifiers: Area redevelopment.

Construction of all facilities enumerated in the preliminary report has been justified. Section III of this report presents the initial development program for each park. Additional facilities shown in Section IV will be constructed as required to satisfy demand. While estimated revenue production of several facilities included in the initial program fail to justify their cost directly, they are required to create a complete and balanced recreation resource. Their importance to the fiscal aspect of each park lies in the induced effect they will have on other revenue producing facilities. Based on the foregoing we recommend that action be taken to issue revenue bonds to finance construction of the initial development program as enumerated in Section III of this report. Since it will not be possible to treat Conchas Lake and Ute Lake State Parks concurrently, we recommend the initial issue be for Conchas and that the Ute project be funded as quickly as details on financing and final design can be formulated. (Author)

PB-169 719 **Field 5C, 11L**
CFSTI Prices: HC$3.00 MF$0.75
Oklahoma Univ., Norman. Bureau of Business Research.
THE ECONOMIC FEASIBILITY OF A MANUFACTURING PLANT UTILIZING WOOD RESIDUES IN McCURTAIN COUNTY, OKLAHOMA.
Jan 65, 67p
Contract Cc-6031
Rept. on Technical Assistance Proj. U. S. Dept. of Commerce, Area Redevelopment Admin., Washington, D. C.

Descriptors: (*Economics, Oklahoma), (*Wood, Economics), (*Industrial plants, Oklahoma), Charcoal, Composition board, Particles, Powders, Feasibility studies, Methanols, Chemicals, Commerce.

Identifiers: Area redevelopment.

The purpose of this study is to ascertain the economic feasibility of a plant to be located in McCurtain County, Oklahoma, which will manufacture products from the saw mill residue of the area. The area has a number of saw mills, ample supplies of forest products, and a large labor force. A plant producing particle board will be able to operate profitably. Sales are expected to start at $1,460,000 and climb to $2,100,000.00 by 1970. Likewise, profits will increase from a low of $75,953 in the first year of operation to $190,852 six years later. As a per cent of initial investment, profits will increase from 5.9 per cent in the first year to 14.7 per cent six years later. A charcoal briquette plant located in Oklahoma will not be feasible because the current production capacity of existing plants in the area exceeds demand. In addition to particle board and charcoal, wood residues can be utilized in other products; these include livestock bedding and compost for soil improvement. A plant producing particle board from wood residue will be profitable. At least one new plant of moderate size will be required by 1966 and by 1970 a second plant will also be required. A plant producing charcoal wood alcohol and other wood chemicals will not be profitable.

PB-169 720 **Field 5C, 6H**
CFSTI Prices: HC$2.00 MF$0.50
Oklahoma Univ., Norman. Bureau of Business Research.
THE ECONOMIC FEASIBILITY OF A FOOD PROCESSING PLANT IN OKMULGEE, OKLAHOMA.
Jun 63, 42p
Contract Cc-5913

Descriptors: (*Economics, Oklahoma), (*Food, Processing), (*Industrial plants, Oklahoma), Commerce, Feasibility studies, Costs.

Identifiers: Area redevelopment.

This study was made to determine the economic feasibility of a plant to be located in Okmulgee, Oklahoma for processing foods. In order that the firm will have a stable year around operation, foods with complementary seasons were selected. The profitability, employment, resource utilization, and long range outlook of the proposed plant are the factors upon which its desirability is hinged. In determining the feasibility of the proposed plant, the market for its output was examined. Then the extent to which the potential market is presently served by processors within and beyond its borders was ascertained. Next, the extent of required raw materials and manpower in the vicinity of Okmulgee was determined. A design of the proposed plant and equipment and the operating techniques was outlined in broad terms. The costs of investment in capital and equipment, initial operating expenses, and capital costs were then estimated. Lastly, a financing plant was drawn up and a projection made of anticipated revenue and expenses. It is the conclusion of the study that the plant is feasible. It will provide 55 jobs and a sizeable payroll for the area. The projected growth of the area indicates that the plant will grow and be a stable influence on the economy of the area.

PB-169 724 **Field 5C, 5I, 8F**
CFSTI Prices: HC$1.00 MF$0.50
Program Research, New York.
ANSONIA AREA OF SOUTHWESTERN CONNECTICUT: TOWNS OF DERBY, ANSONIA, SEYMOUR, AND OXFORD.
Summary follow-up rept. (Final),
by Richardson Wood. May 63, 8p

Descriptors: (*Economics, Connecticut), (*Labor, Connecticut), (*Employment, Connecticut), Industries, Commerce, Manpower studies, Construction, Population.

Identifiers: Area redevelopment.

Objective of Study: (1) To appraise the potentials for both immediate and longterm growth in employment; (2) To assist local development groups in forming active employment development programs. Scope: (1) General economic background of four-town area; (2) Employment trends and influences; (3) Reasons for present unemployment; (4) Evaluation of opportunities for development; (5) Community organization for development.

PB-169 725 **Field 5C, 5I, 8F**
CFSTI Prices: HC$1.00 MF$0.50
Program Research, New York.
FLAT RIVER AREA OF SOUTHEASTERN MISSOURI, STE. GENEVIEVE, ST. FRANCOIS, WASHINGTON, MADISON AND IRON COUNTIES.
Summary follow-up rept. (Final),
by Richardson Wood. May 63, 8p

Descriptors: (*Economics, Missouri), (*Labor, Missouri), (*Employment, Missouri), Commerce, Population, Mining engineering, Industries, Recreation, Manpower studies.

Identifiers: Area redevelopment.

Objective of Study: (1) To appraise the potentials for both immediate and longterm growth in employment; (2) To assist local development groups in forming active employment development programs. Scope: (1) General economic background of 5-county area; (2) Employment trends and influences; (3) Reasons for present unemployment; (4) Evaluation of opportunities for development; and (5) Community organization for development.

PB-169 726 **Field 5C, 5I, 8F**
CFSTI Prices: HC$1.00 MF$0.50
Program Research, New York.
MEADVILLE LABOR MARKER AREA IN CRAWFORD COUNTY, NORTHWESTERN PENNSYLVANIA.
Summary follow-up rept. (Final),
by Virginia Keyser. May 63, 9p

Descriptors: (*Economics, Pennsylvania), (*Labor, Pennsylvania), (*Employment, Pennsylvania), Commerce, Recreation, Manpower studies, Industries, Agriculture, Population.

Identifiers: Area redevelopment.

Objective of Study: (1) To appraise the potentials for both immediate and longterm growth in employment; (2) To assist local groups in forming active employment development programs. Scope: (1) General economic background of area; (2) Employment trends and influences; (3) Reasons for present unemployment; (4) Make-up of unemployed pool; (5) Evaluation of assets for industrial, commercial, agricultural, and tourist-recreational development; and (6) Community organizations for growth and development.

PB-169 729 **Field 5C**
CFSTI Prices: HC$3.00 MF$0.75
Herkenhoff (Gordon) and Associates, Albuquerque, N. Mex.
STATE OF NEW MEXICO DEVELOPMENT PLAN OF RECREATION FACILITIES FOR BLUEWATER LAKE STATE PARK.
Jul 65, 77p
Contract Cc-6123
Prepared in cooperation with Dept. of Commerce, Washington, D. C. Area Redevelopment Admin. Technical Assistance Project.

Descriptors: (*Economics, New Mexico), (*Recreation, Economics), Commerce, Natural resources, Lakes, Dams.

Identifiers: Area redevelopment.

Construction of all facilities enumerated in the preliminary report has been justified. Section III of this report presents the initial development program for the park. Additional facilities shown in Section IV will be constructed as required to satisfy demand. While estimated revenue production of several facilities included in the initial program fail to justify their cost directly, they are required to create a complete and balanced recreation resource. Their importance to the fiscal aspect of the park lies in the induced effect they will have on other revenue producing facilities. Based on the foregoing we recommend that action be taken to issue revenue bonds to finance construction of the initial development program as enumerated in Section III of this report. (Author)

PB-169 737 **Field 5C, 2B**
CFSTI Prices: HC$1.00 MF$0.50
Illinois Univ., Urbana. Coll. of Agriculture.
THE FEASIBILITY OF GROWING GREENHOUSE TOMATOES IN SOUTHERN ILLINOIS,
by J. W. Courter, J. S. Vandemark, and R. A. Hinton. Aug 65, 23p Circular 914
Supported in part by a grant from the U. S. Department of Commerce, Area Redevelopment Administration, Technical Assistance Proj.

Descriptors: (*Economics, Illinois), (*Agriculture, Illinois), (*Fruits, Economics), Labor, Employment, Commerce, Distribution (Economics), Meteorology, Costs, Feasibility studies.

Identifiers: Area redevelopment, Tomatoes, Greenhouses.

The Southern 32 counties of Illinois include about 25 percent of the state's geographic area but only about 10 percent of the population. The economy of the region depends mainly on manufacturing and general farming supported by mining, retailing, and construction. Technological advances in agriculture have reduced the labor requirements of farms, resulting in part-time farm employment for a significant proportion of farm operators. Automation in mining has further reduced employment in the area. If farming is to continue as a major economic activity for a farm operator and his family, the operator must increase the size of his farm business in order to fully utilize available labor. Growing vegetables in either glass or plastic greenhouses affords one opportunity for intensive production, requiring high labor input but only nominal land utilization. About three full-time men per acre are needed for greenhouse production. In comparison, 150 to 300 acres are necessary to keep one man fully employed in general farming in this area. The potential for high economic return can justify the substantial capital investment required for greenhouse facilities. This study emphasizes greenhouse production of tomatoes. Other vegetable crops are briefly mentioned where they may be involved in production schedules. (Author)

PB-169 742 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Anderson-Nichols and Co., Inc., Boston, Mass.
MASTER DEVELOPMENT PLAN NEW BEDFORD INDUSTRIAL PARK.
Nov 64, 82p
Contract C-6118

Descriptors: (*Economics, Massachussets), (*Industries, Massachussets), Transportation, Commerce, Labor, Roads, Employment, Construction, Law, Education, Power supplies, Civil engineering, Railroads, Sewage, Drainage, Sanitary engineering, Water supplies, Costs.

Identifiers: Area redevelopment.

The New Bedford Industrial Park, designed to meet present and future needs of industry, is an attractive area with service roads and utilities. The Park, administered by the New Bedford Industrial Development Commission, has grown to the extent that it is necessary to complete the planning of the undeveloped and adjacent areas to insure its continued growth as an asset to the City. The requirements of industry vary widely. The plan divides the Park into parcels designed to accommodate small, as well as large industries. It provides for construction of roads, utilities, railroad and other facilities required to serve the Park and recommends that construction of improvements be accomplished in four phases as the need develops. Economic investigations indicate an abundance of skilled and unskilled labor. Approximately eight percent of the Greater New Bedford labor force of 62,900 is unemployed. The report states that the Park is particularly well suited for industries requiring hand labor for detail work. Zoning regulations governing the Industrial Park Area permit heavy industry with the stipulation that noisy, noxious or otherwise offensive operations be suppressed. In addition, certain standards of construction have been established precluding erection of substandard structures.

PB-169 866 **Field 5I, 13L, 13B**
CFSTI Prices: HC$3.00 MF$0.75
California State Dept. of Motor Vehicles.
THE EFFECTIVENESS OF SHORT INDIVIDUAL DRIVER IMPROVEMENT SESSIONS,
by R. S. Coppin, R. C. Peak, A. Lew, andW. C. Marsh. Oct 65, 76p Rept. no. 0307
Prepared in cooperation with Division of Drivers Licenses, Calif. and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Retraining, Motor vehicle operators), (*Motor vehicle operators, California), Traffic, Law, Control, Effectiveness, Performance (Human), Motor vehicle accidents, Passenger vehicles, Statistical analysis, Training.

Identifiers: Traffic violations.

The objective of this study was to determine the effects of driver improvement hearings on subsequent driving performance. Thirty-five hundred cases of negligent drivers who had been called in for a hearing and a group of 2,000 control drivers who were classified as negligent drivers but had not been notified for a hearing were selected for the study. Subjects from each group were matched by age, sex, marital status, prior accidents and prior traffic citations. From these groups 501 summer hearing matches and 466 non-summer hearing matches were made. The matched control and hearing drivers were then compared on their subsequent two years driving record. Statistical analyses of these comparisions showed: The hearing group had significantly fewer citations in the first subsequent year than the control group. No significant difference was found between the hearing and control group with respect to citation frequency in the second subsequent year. No significant difference was found between the hearing and control groups with respect to subsequent accident frequency in either the first or second subsequent year. The various age groups did not appear to be differentially affected by the hearing process. The hearing significantly delayed receipt of initial citations in the subsequent-to-treatment interval. No significant difference in the onset of subsequent initial accident involvement was noted between the groups. (Author)

6. BIOLOGICAL AND MEDICAL SCIENCES

AD-429 432 **Field 6A**
CFSTI Price: HC$3.00
Jewish Hospital of Brooklyn, N. Y.
EXPLORATION OF THE VAPOR PHASE ULTRAVIOLET SPECTRA OF THE HORMONES FROM THE ADRENAL AND RELATED SUBSTANCES.
Technical rept.,
by Samuel Natelson and John Bonas. Dec 63, 90p
Contract AF 29 (600)-3337,
Proj. AF-6892,
Task 68922
ARL TDR-63-29

Descriptors: (*Hormones, Ultraviolet spectroscopy), (*Ultraviolet spectroscopy, Hormones), Adrenal glands, Steroids, Vapors, Absorption spectrum, Corticosteroid agents, Benzaldehydes, Benzenes, Ethers, Sensitivity, Biological assay.

Identifiers: Desoxycorticosterones, Estradiol, Cortisone, Estrone, Veratrole, Vanillin.

The absorption spectra for certain steroid and catechol derivatives in the range from 185-300 mu. in the vapor state is compared to the absorption spectra of these compounds observed in solvents. It is pointed out that better resolution and higher sensitivity is observed in the vapor state. Elevated temperatures are used to vaporize these compounds and a practical cuvette and heating means are described for this purpose. At elevated temperatures certain bands visible at low temperatures are wiped out in the range of approximately 230 mu. However, other bands of high degree of absorptivity appear at from 185-210 mu. The spectra of derivatives of desoxy corticosterone, cortisone, estradiol, estrone, veratrole and vanillin are explored. A literature survey of methods for steroid assay is included. (Author)

AD-468 294 **Field 6M**
CFSTI Prices: HC$1.60 MF$0.50
George Washington Univ., Washington, D. C. School of Medicine.
STUDIES ON THE GENETICS OF VIRULENCE IN ENTERIC BACTERIA.
Final technical rept., 1 Sep 64-1 Sep 65,
by Robert C. Parlett. 1 Sep 65, 19p
Contract DA-49-193-MD=2376

Descriptors: (*Bacteria, Genetics), (*Genetics, Bacteria), Viability, Antigens + antibodies, Shigella flexneri, Escherichia coli, Salmonella typhosa, Guinea pigs, Growth, Tissues (Biology), Chromosomes.

A Shigella flexneri 2a hybrid produced by mating with an Escherichia coli Hfr strain lost its ability to cause a fatal enteric infection when fed to starved guinea pigs. However, the hybrid retained other properties of virulence associated with its virulent S. flexneri parent, namely, the ability to produce kerato-conjunctivitis in guinea pigs, and the ability to invade and multiply within HeLa cells. Examination of pathology in the starved guinea pig model showed that the parent Shigella strain invaded the intestinal mucosa causing a severe inflammatory reaction in the lamina propria, which progressed to ulceration of the intestine and death of the animal. The hybrid also invaded the intestinal mucosa and produced an inflammatory reaction. However, it failed to maintain itself in the mucosa, the inflammatory reaction subsided, the intestine returned to normal within 4 days and the animal survived. These findings indicate that Shigella virulence involves both the capacity to reach the lamina propria and the ability to multiply in this region. A Salmonella typhosa Hfr strain was used to transfer the Vi antigen and somatic antigen 9 to S. typhimurium recipient strains, and the genetic determinants of these antigens were mapped.

AD-468 340 **Field 6A**
CFSTI Prices: HC$1.60 MF$0.50
Laboratory for Comparative Biochemistry, La Jolla, Calif.
RED CELL METABOLISM RELATED TO BLOOD STORAGE.
Annual progress rept. 1 Jul 64-30 Jul 65,
by Grant R. Bartlett. 30 Jul 65, 20p
Grant DA-MD-49-193-65-G146

Descriptors: (*Erythrocytes, Metabolism), (*Bio chemistry, Erythrocytes), Preservation, Blood, Storage, Ribose, Adenosine phosphates, Phos phorylation, Nucleosides, Ion exchange, Chro matographic analysis, Purines.

A detailed study has been carried out on the metabolism of the deoxyribose analogs of inosine and adenosine by outdated blood-bank stored human red cells. Both compounds are utilized rapidly to give hypoxanthine, acetaldehyde, lactic acid and a variety of intracellular intermediates including deoxyribose 5-phosphate, deoxy xylulose 1-phosphate and deoxy octulose 1, 8-diphosphate, in addition to the usual glycolytic intermediates. Deoxyadenosine but not deoxyinosine or deoxyinosine plus adenine led to the synthesis of considerable amounts of deoxyATP. There was evidence for the conversion of deoxyribo nucleotide to ribo nucleotide. Evidence is brought forward that a compound identified as ribose 1, 5-diphosphate which accumulates in human red cells incubated with inosine but not with inosine plus adenine, is in fact a degradation product of 5-phosphoribosyl 1-pyrophosphate. An improved method is reported for the recovery by ion-exchange column chromatography from red cell incubations of: inosine, adenosine, deoxyinosine, deoxyadenosine, hypoxanthine and adenine. (Author)

AD-474 585 **Field 6O**
CFSTI Prices: HC$1.60 MF$0.50
Naval Medical Field Research Lab., Camp Lejeune, N. C.
PENTOBARBITAL SODIUM ANESTHESIA IN THE DOG.
Interim rept.,
by J. P. Gilmore. Nov 65, 11p Vol. 15/No. 26
NAVMED MR005.12-7020-1-8

Descriptors: (*Barbiturates, Dogs), Anesthesia, Cardiovascular system, Blood pressure, Spleen, Excision, Leukocytes, Erythrocytes, Blood diseases.

Patent 3,229,689 **Field 6L**
RESUSCITATION APPARATUS.
Patent assigned to NASA,
by Laurence M. Christman. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Artificial respiration, Medical equipment), Patents, Pressure.

The apparatus includes a soft rubber oro-pharyngeal tube which is inserted into the throat of a person so that oxygen may be delivered directly to the trachea and lungs. The apparatus also includes a conventional oxygen supply cylinder, an adjustable pressure regulator and a conventional pressure breathing mask interposed in the oxygen supply line from the regulator and worn by the person delivering the oxygen.

PB-169 600 **Field 6D**
CFSTI Prices: HC$1.60 MF$0.50
Swarthmore Coll., Pa. Dept. of Electrical Engineering.
PATTERN LEARNING BY SUBSET SELECTION: AN IMPROVED METHOD.
Final rept.,
by Carl Barus. 28 Dec 63, 18p
Grant NSF-G-5945

Descriptors: (*Pattern recognition, Set theory), (*Set theory, Pattern recognition), Learning machines, Artificial intelligence, Bionics, Statistical processes.

A method of pattern learning by selecting and storing representative subsets of each pattern has been previously reported. Each subset of pattern specimens serves as a model of the distribution function of that pattern. The accuracy of the model is gra-

dually increased by changing the subset in accordance with experience. A number of improvements have been made in the basic method, and several flaws in the earlier program have been eliminated. A sounder theoretical basis for the method has been developed. Although the method requires appreciable storage capacity, the computations required are particularly simple and for the most part involve only counting. In applications where the time factor is not urgent, the method can be easily mechanized, using card or tape storage for example. A learning system built along the proposed lines could be useful in research applications where the investigator himself is seeking criteria to classify his observations. Such a system might serve as a general-purpose research tool. Applications to biological and medical research suggest themselves. (Author)

PB-169 653 **Field 6G, 17B**
CFSTI Prices: HC$2.60 MF$0.50
National Aviation Facilities Experiment Center, Atlantic City, N. J.
FEASIBILITY TEST OF SEARCH AND RESCUE RADIO BEACON.
Final rept.,
by John H. Torbert and Francis W. Jefferson.
Dec 65, 26p
Proj. FAA-221-150-08X
RD 65-136

Descriptors: (*Air-sea rescue beacons, Feasibility studies), (*Radio beacons, Air-sea rescues), Radiofrequency, Rescue beacons, Ultrahigh frequency, Very high frequency, Radio signals, Modulation, Radio homing, Ranges (Distance), Life expectancy, Radio transmitters, Radio receivers, Sea rescue equipment.

This report contains the results of technical tests performed on a feasibility model of a dual-frequency VHF/UHF Search and Rescue Radio Beacon (SRRB) loaned to the Federal Aviation Agency by Granger Associates of Palo Alto, California. The SRRB was tested at the National Aviation Facilities Experimental Center and at sea off the New Jersey coast, with the asistance of the U. S. Coast Guard, to investigate equipment performance and to evaluate two types of carrier modulation (constant and swept-tone) specially incorporated in the SRRB provided for test. Results of the tests indicated that the concept of a dual-frequency SRRB is feasible for search and rescue operations, that its use would increase the number of search aircraft now available to include all operational military aircraft, and that the swept-tone modulation is most desirable for this application.

PB-169 671 **Field 6R, 6H**
CFSTI Prices: HC$3.00 MF$0.75
Minnesota Univ., Minneapolis.
FACTORS INFLUENCING STRONTIUM-90 IN MILK FROM THE BRAINERD, MINN. MILKSHED.
Environmental health series.
Dec 62, 77p
PHS Pub-999-R-1
Prepared in cooperation with Minnesota Dept. of Health.

Descriptors: (*Milk, Radiological contamination), (*Radiological contamination, Milk), (*Strontium, Radiological contamination), Radioactive isotopes, Soils, Minnesota, Bovines, Grasses, Agriculture, Radioactive fallout, Rainfall, Health physics.

A study was undertaken to investigate consistent farm-to-farm differences in the concentrations of strontium-90 found in milk produced within a small milkshed in central Minnesota. Covering an 8-month period, the study included sampling of milk, hay, grain, silage, water, forage, soil, and precipitation. The data indicate that 70 to 90 percent of the cattle's strontium-90 intake came from the native grass hay and that the farm-to-farm differences of strontium-90 concentrations in milk correspond to similar differences of strontium-90 concentrations in the hay fed. On the basis of the data obtained, it is not possible to explain why the consistent differences in the native grass hay existed. (Author)

PB-169 672 **Field 6R, 7E**
CFSTI Prices: HC$3.00 MF$0.75
Public Health Service, Washington, D. C. Div. of Radiological Health.
PROCEDURES FOR DETERMINATION OF STABLE ELEMENTS AND RADIONUCLIDES IN ENVIRONMENTAL SAMPLES.
Environmental health series.
by C. R. Porter, R. J. Augustine, J. M. Matusek, Jr., andM. W. Carter, Jan 65, 91p
PHS Pub-999-RH-10

Descriptors: (*Radiochemistry, Radiological contami nation), (*Health physics, Test methods), Instruction manuals, Chemical analysis, Radiation monitors, Radioactive isotopes, Radioactive decay, Radiation measurement systems, Food, Milk, Silt, Soils, Water, Radiobiology, Plants (Botany), Animals.

This is a manual of methods used at the Public Health Service's Southeastern Radiological Health Laboratory for the determination of stable elements and radionuclides in environmental samples. The procedures are intended for use in the processing of relatively large numbers of samples in a minimum of time for environmental radiological surveillance. The manual is divided into sections on: milk; food, biota, silt, and soil; water; and counting procedures. Appendixes cover preparation of reagents and tables of selected radionuclide decay and ingrowth factors. (Author)

PB-169 692 **Field 6R**
CFSTI Prices: HC$10.60 MF$0.75
Freie Universitaet Berlin (West Germany). Nuklearmedizinische Abteilung.
AUSGEWAEHLTES SCHRIFTTUM NACH SACHGEBIETEN (BIBLIOGRAPHIC REVIEW OF SELECTED SUBJECTS).
Jul 63, 107p
AED C-10-01
NSF Scientific documentation project. Text in German.

Descriptors: (*Radiobiology, Bibliographies), Radioactive isotopes, Germany, Liver, Spleen, Pancreas, Fats, Diagnosis, Diagnostic agents.

A collection of 282 bibliographic references is given for material on the use of nuclides in diagnosis of diseases of the nerves, liver, spleen, and pancreas and in disturbances to the absorption of fat. The collection begins with references to methods for scanning radioisotopes. The publication is one of the bibliographic series of the Atomic Energy Information Service of the Gmelin Institute.

PB-169 702 **Field 6H, 5C**
CFSTI Prices: HC$3.00 MF$0.75
New Bedford Inst. of Tech., Mass. Research Foundation.
SCALLOP AND FLOUNDER MARKETING STUDY.
1965, 93p
Contract CC-5915

Descriptors: (*Seafood, Industries), (*Commerce, Seafood), (*Economics, Massachusetts), Fishes, Management engineering, Management planning, Distribution (Economics), Consumption, Packaging.

The Market Research Phase of the Scallop and Flounder Study was undertaken in an attempt to assist the sea scallop and flounder fishing industries in the depressed area of New Bedford, Massachusetts. A test advertising promotion campaign was devised and conducted in representative areas of the country to determine the effect of such promotion upon the consumption of sea scallops and flounder. It was found that a strong potential for new scallop sales exists in the west coast area, and that the proper combination of consumer advertising, publicity, and store promotion can substantially increase flounder fillet sales in the northeast quarter of the United States. It has further been found, however, that the New Bedford fishing industry is in serious need of an over-all marketing program. Under such a program the industry should form a marketing organization to coordinate research and development and production and management, not merely advertising and promotion.

PB-169 813 **Field 6E, 6F, 6S, 4B**
CFSTI Prices: HC$1.00 MF$0.50
Weather Bureau, Washington, D. C.
PART 1: WEATHER AND DISEASE. PART 2: SOLAR RADIATION AND SKIN CANCER DEATHS.
Environmental data service rept. (Technical note),
by H. E. Landsberg and G. D. Brinckerhoff, Feb 66, 14p WBTN-33-EDS-1

Descriptors: (*Diseases, Meteorological parameters), (*Meteorological parameters, Diseases), (*Solar radiation, Cancer), (*Cancer, Solar radiation), Skin, Ultraviolet radiation, Air pollution, Respiratory system, Heart, Rheumatic diseases, Burns, Sun, Frostbite, Meteorology.

The atmospheric environment can cause sunburn, heatstroke, and frostbite. Air pollution may provide or aggravate asthma. Weather changes often influence scar and arthritic pains. There are suspicions that the course of respiratory and certain heart ailments is influenced by atmospheric conditions. Indirectly, through influences on disease vectors, the climate plays a role in tropical diseases. Favorable climatic conditions, on the other hand, may alleviate the symptoms of various diseases. Skin cancer death rates (other than from malignant melanoma) in the United States metropolitan areas were compared with data on solar radiation intensity. A statistically significant positive correlation was found but it explains only 10 percent of the variance. For more meaningful work in this field measurements of ultraviolet radiation and incidence rate of this disease complex are needed. (Author)

PB-169 831 **Field 6E, 5A**
CFSTI Prices: HC$7.00 MF$1.75
Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.
STUDIES BASIC TO CONSIDERATION OF ARTIFICIAL HEART RESEARCH AND DEVELOPMENT PROGRAM.
Final rept.,
by R. B. Laning, 11 Feb 66, 351p SVHSER-3870
Contract PH-43-66-20
Sponsored by National Heart Institute.

Descriptors: (*Heart, Mechanical organs), (*Mechani cal organs, Medical research), (*Medical research, Heart), Population, Statistical analysis, Cardiovascular diseases, Mortality rates, Sociology, Physiology, Implants, Immunology, Prosthetics, Diagnosis, Pumps, Power supplies, Thermoelectricity, Batteries + components, Energy conversion, Heat production (Biology), Fuel cells, Combustion, Nuclear energy, Materials, Metals, Plastics, Elastomers, Coatings, Cardiovascular sys tem, Blood pressure, Blood circulation, Blood coagula tion, Hemolysis, Metabolism, Hypothermia, Surgical techniques, Urinary system, Mechanics, Performance (Engineering), Specifications, Mathematical models, Control systems, Reliability, Cost effectiveness, Management planning, Research program administration.

Identifiers: Demography, Extracorporeal circulation.

The study is made up of seven tasks: (1) Assessment and definition of the problem; (2) Characteri-

zation of the biomedical and technological problems; (3) Technology survey and reference data compilation; (4) Estimated future extension of technology; (5) Determination of key technical problems in artificial heart development; (6) Assessment of other resources for artificial heart development; (7) Determination of performance criteria for the artificial heart. An Artificial Heart Program Plan is presented.

PB-169 832 **Field 6E, 5A**
CFSTI Prices: HC$7.00 MF$1.75
Stanford Research Inst., Menlo Park, Calif.
ARTIFICIAL HEART DEVICES AND SYSTEMS: A CONCEPTUAL PHASE STUDY,
by Mark S. Blumberg, Kenneth W. Gardiner, Donald J. Lyman, and Peter M. Newgard. Jan 66, 375p
Contract PH-43-65-1058,
Proj. SRI-1-5597
Sponsored by National Heart Institute.

Descriptors: (*Heart, Mechanical organs), (*Mechanical organs, Medical research), (*Medical research, Heart), Federal budgets, Cost effectiveness, Statistical analysis, Population, Mortality rates, Prosthetics, Implants, Immunology, Pumps, Valves, Power supplies, Energy conversion, Batteries + components, Nuclear energy, Fuel cells, Thermoelectricity, Heat production (Biology), Heat transfer coefficients, Materials, Plastics, Control systems, Failure (Mechanics), Life expectancy, Performance (Engineering), Hospitals, Surgical techniques, Cardiovascular diseases, Blood circulation, Blood pressure, Blood coagulation, Hemolysis, Medical supplies, Specifications, Reliability, Diagnosis, Man power studies, Phase studies, Queueing theory, Management planning, Research program administra tion, Bibliographies.

Identifiers: Demography, Extracorporeal circulation.

The factors studied include: (1) The possible number of people who might benefit if artificial heart devices were successfully developed; (2) The principal technological problems in developing these devices, as determined from review of the present state of the art, not only in artificial hearts but also in other pertinent fields of science and engineering; (3) The most desirable initial and subsequent steps that should be taken in research and development on such artificial heart devices if it is decided to proceed with artificial heart programs; (4) Estimates of the probable time and costs of research and development programs; (5) Estimates of annual and total costs of programs for the application of artificial hearts and ventricular assist devices; (6) Economic, ethical, and other problems that may have to be resolved in the use of artificial heart devices; (7) Possible or probable benefits of complete programs as related to their costs.

PB-169 833 **Field 6E, 5A**
CFSTI Prices: HC$3.00 MF$0.50
Thermo Electron Engineering Corp., Waltham, Mass.
ARTIFICIAL HEART PROGRAM.
Final rept., summary and conclusions.
Mar 66, 52p TE-50-66
Contract PH-43-66-9
Prepared in cooperation with Children's Hospital Medical Center, Boston, Mass.

Descriptors: (*Heart, Mechanical organs), (*Mechanical organs, Medical research), (*Medical research, Heart), Implants, Prosthetics, Power supplies, Energy conversion, Batteries + components, Nuclear energy, Radio active isotopes, Thermoelectricity, Blood circulation, Heat production (Biology), Mortality rates, Statistical analysis, Cardiovascular diseases, Cost effectiveness, Research program administration.

Contents: The need for artificial heart devices; Basic objective of the artificial heart program; Temporary left ventricular assistance: (a) emergency devices to stabilize the circulation; (b) implantable assist pump; Total implantability: A prerequisite to permanent circulatory support; Permanent left ventricular assistance; Total heart replacement; Power requirements and energy storage; Implantable power supply; Technical feasibility; Economic feasibility; Resource requirements; Recommendations for a national program.

PB-169 834 **Field 6E, 5A**
CFSTI Prices: HC$4.00 MF$1.00
Westinghouse Electric Corp., Pittsburgh, Pa. Research and Development Center.
STUDIES BASIC TO CONSIDERATION OF ARTIFICIAL HEART RESEARCH AND DEVELOPMENT.
Final rept. on definition of proposed research and development programs.
Jan 66, 136p
Contract PH-43-65-1060
Sponsored by National Heart Institute.

Descriptors: (*Heart, Mechanical organs), (*Mechanical organs, Medical research), (*Medical research, Heart), Research program administration, Prosthetics, Implants, Population, United States, Statistical analysis, Aging (Physiology), Mortality rates, Pumps, Batteries + components, Blood circulation, Blood pressure, Cardiovas cular diseases, Power supplies, Heat production (Biology), Thermoelectricity, Materials, Hemolysis, Surgical techniques, Hospitals, Diagnosis, Life expectancy, Performance (Engineering), Rehabilitation, Specifications, Management planning.

The report summarizes and integrates the results and conclusions presented in the seven major task reports. In addition, the report defines a proposed Research and Development Program, including cost, scope, and pacing, together with sufficient data to indicate the basis on which determinations were made. The proposed program or 'master plan' is designed to assist the National Heart Institute in making decisions relative to future work in this area.

PB-169 835 **Field 6E, 5A**
CFSTI Prices: HC$5.00 MF$1.00
General Dynamics/Convair, San Diego, Calif.
STUDIES BASIC TO CONSIDERATION OF ARTIFICIAL HEART RESEARCH AND DEVELOPMENT PROGRAM.
Final rept. on artificial heart program.
21 Jan 66, 148p GDC-DBD-66-006
Contract PH-43-65-1059
Sponsored by National Heart Institute.

Descriptors: (*Heart, Mechanical organs), (*Mechanical organs, Medical research), (*Medical research, Heart), Implants, Prosthetics, Installation, Maintenance, Performance (Engineering), Pumps, Valves, Power supplies, Materials, Cost effectiveness, Manpower studies, Statistical analysis, Medical personnel, Training, Surgical techniques, Blood circulation, Cardiovascular diseases, Diagnosis, Immunology, Hemolysis, Control systems, Sociology, Reliability, Management planning, Specifications, Cost effectiveness, Research program administration.

The basic objective of the study is to provide a total plan for research, development, production, and clinical application of an artificial heart. The plan includes a technical plan and guidelines for specific research leading to a safe, reliable, artificial heart that is practical and workable and will satisfy all the physiological, engineering, and clinical requirements. The report will help provide a basis for deciding the nature and scope of the work to be done and the pacing constraints. Total resources for the development of the program are considered in relation to the requirements, key problems, and program phases. The report provides basic recommendations, data, and guidelines for National Heart Institute to use in making decisions and arriving at an overall program plan for the development of an artificial heart.

7. CHEMISTRY

AD-443 425 **Field 7D, 20K, 20F**
CFSTI Price: HC$1.60
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
RYDBERG ABSORPTION SERIES OF N2.
Physical sciences research papers,
by M. Ogawa and Y. Tanaka. May 64, 20p
AFCRL-BSRP-14, AFCRL-64-349
Proj. AF-8627

Descriptors: (*Nitrogen, Absorption spectrum), (*Ultraviolet spectroscopy, Nitrogen), Diatomic molecules, Molecular energy levels, Molecular structure, Quantum mechanics.

The absorption spectrum of N2 in the 600-1000 A region, particularly the Rydberg series, was investigated with a grazing incidence spectrograph with a 6.8-meter concave grating.

AD-450 645 **Field 7D**
CFSTI Price: HC$1.60
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
FORBIDDEN ABSORPTION-BAND SYSTEMS OF N2 IN THE VACUUM-ULTRAVIOLET REGION.
Physical sciences research papers,
by Y. Tanaka, M. Ogawa, and A. S. Jursa. 27 Jan 64, 16p AFCRL-PSRP-51, AFCRL-64-783
Proj. AF-8627
Reprinted from the Journal of Chemical Physics v40 n12 p3690-3700 Jun 15 1964.

Descriptors: (*Nitrogen, Ultraviolet spectroscopy), (*Ultraviolet spectroscopy, Nitrogen), Absorption spectrum, Band spectrum, Molecular energy levels, Physical chemistry, Molecular rotation, Molecular spectroscopy.

Five systems of absorption bands of N2, were investigated in the 1070-1600-A region. A 2-m and a 3-m vacuum spectrograph, both of normal-incidence-type, were used in this work. The observations were extended to high vibration levels for four of the systems, alpha (upsilon = 13), alpha (upsilon = 15), B' (upsilon = 20), omega (upsilon = 11), while in the C-X system only two bands were analyzed. The progression which was previously ascribed as belonging to the omega-X system was studied in detail, and an alternate possibility of this progression being the upsilon'' = 1 progression of the alpha-X system was definitely removed. However, a final designation of the upper electronic state must come from a rotational analysis, because the observed T sub 00 of the state differed from that of the omega state by approximately 40/cm. The potential energy curves of the low-lying N2 states prepared by Mulliken are compared with those calculated by using the presently determined constants. (Author)

AD-451 617 **Field 7D, 20F**
CFSTI Price: HC$1.60
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
NITROGEN AND OXYGEN ABSORPTION CROSS-SECTIONS IN THE VACUUM ULTRAVIOLET.
Physical sciences research papers,
by R. E. Huffman, Y. Tanaka, and J. C. Larrabee. Oct 64, 13p AFCRL-PSRP-60, AFCRL-60-860
proj. AF-8627

Descriptors: (*Nitrogen,Absorption spectrum), (*Oxygen, Absorption spectrum), (*Photochemistry, Upper atmosphere, Photochemistry), Solar radiation, Ultraviolet radiation, Ultraviolet spectroscopy, Line spectrum, Continuous spectrum.

Identifiers: Wood alcohol.

This study was made to determine the economic feasibility of a wood alcohol-charcoal manufacturing plant to be located in Latimer County, Oklahoma. In order to attain this objective, the profitability, employment, resource utilization, and long range outlook of the proposed plant were scrutinized. On the basis of the findings of this study it is recommended that neither the integrated plant nor the charcoal plant be established since markets for these products either do not exist or are already over supplied.

AD-451 622 **Field 7D**
CFSTI Price: HC$1.60
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
ABSORPTION SPECTRA OF H2 IN THE VACUUM -ULTRAVIOLET REGION. I. THE LYMAN AND THE WERNER BANDS.
Physical sciences research papers,
by T. Namioka. 5 Feb 64, 17p AFCRL-PSRP-56, AFCRL-64-838
Proj. AF-8627
The Journal of Chemical Physics v40 n11 p3154-65 Jun 1 1964.

Descriptors: (*Hydrogen, Ultraviolet spectroscopy), (*Ultraviolet spectroscopy, Hydrogen), Absorption spectrum, Band spectrum, Molecular rotation, Molecu lar energy levels, Molecular spectroscopy, Physical chemistry.

The absorption spectrum of the H2 molecule has been studied in the wavelength region 930-840 A with a 6.8-m grazing incidence vacuum spectrograph in combination with the helium continuum. The Lyman and the Werner bands have been extended to their dissociation limits. The results of the rotational analysis of these bands are given. Behavior of the potential curve near the dissociation limit and predissociation found in the upsilon = 13 level of the C state are also discussed. (Author)

AD-454 892 **Field 7D, 20F**
CFSTI Price: HC$2.60
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
ISOTOPE SHIFT OF THE NITROGEN ABSORPTION BANDS IN THE VACUUM ULTRAVIOLET REGION.
Physical sciences research papers,
by M. Ogawa, Y. Tanaka, and A. S. Jursa. Dec 64, 22p AFCRL-PSRP-70, AFCRL-64-956
Proj. AF-8627

Descriptors: (*Nitrogen, Absorption spectrum), (*Ultraviolet spectroscopy, Nitrogen), Diatomic mole cules, Molecular energy levels, Molecular rotation, Molecular structure, Quantum mechanics, Band spectrum.

AD-467 093 **Field 7D**
CFSTI Prices: HC$4.60 MF$0.50
California Univ., Riverside.
PHOTOCHEMICAL AND PHOTOGALVANIC PROCESSES IN SOLUTION.
Final rept., 1 Mar 61-31 Mar 64,
by James N. Pitts, Jr., Theodore Kuwana, andEdward J. Baum. 13 Jan 65, 49p
Contract AF 19 (604)-8069,
Proj. AF-6694,
Task 669401
AFCRL 65-226,
N65 32665

Descriptors: (*Aromatic compounds, Photochemistry), (*Ketones, Aromatic compounds), (*Photochemistry, Aromatic compounds), Phosphorescence, Fluorescence, Electrochemistry, Paramagnetic resonance, Electron spin resonance, Spectra (Visible+ ultraviolet), Spectra (Infrared), Free radicals, Solutions, Organic solvents, Photolysis, Volumetric analysis, Copper, Oxygen, Catalysis, Surface properties, Platinum, Quinones, Reaction kinetics.

Contents: Paramagnetic resonance of some benzophenone derivatives in their phosphorescent state; Electron spin resonance studies of UV irradiated solutions of anthraquinone and benzophenone; Free radical addition to azobenzene in cumene solution - paramagnetic resonance spectra of some radical intermediates; Photoreduction of 2,2-diphenyl-l-picrylhydrazyl (DPPH) in hydrocarbons; Photochemical and electrochemical studies of organic free radicals. Photopotentials in ketone-alcohol systems; Structural effects in photochemical processes of ketones in solutions; Photometric titration of dissolved oxygen and copper (II); Lifetime of activated Pt surface.

AD-467 161 **Field 7C, 11I**
CFSTI Prices: HC$1.60 MF$0.50
Iowa Univ., Iowa City. Dept. of Chemistry.
HIGH TEMPERATURE POLYMERS FROM 1,3-DIPOLAR ADDITION REACTIONS.
Quarterly progress rept. no. 2, 1 May-31 Jul 65,
by John K. Stille. 31 Jul 65, 18p
Contract DA-11-070-AMC-832 (W),
Proj. DA-5025-11-84203

Descriptors: (*Polymers, Synthesis (Chemistry)), (*Heat resistant plastics, Synthesis (Chemistry)), Amino acids, N-heterocyclic compounds, O-hetero cyclic compounds, Ketones, Nitriles, Chemical reactions, Polarization, Polymerization, Polycyclic compounds, Hydrazine derivatives, Aromatic compounds, Chlorine compounds, Stability, Heat.

The synthetic investigations of two diamino acids, m-phenylenediglycine and N,N'- (4,4'-oxydiphenylene) diglycine, which are precursors of to two bid-sydnones, have been carried out. Two model compounds, 1-3-diphenylpyrazole and 1,1'-diphenyl-3,3'-p-phenylenedipyrazole, have been synthesized from reactions of 3-phenyl sydnone with phenyl acetylene and p-diethynlbenzene, respectively. The latter reaction has been investigated with respect to reaction solvent in order to uncover optimum conditions for the polymerization. Three nitrile imine precursors, phenylhydrazide chloride, isophthaloylhydrazide chloride, and terephthaloylhydrazide chloride, have been synthesized. The reaction of phenylhydrazide chloride with p-diethynlbenzene in the presence of triethyl amine yields 1,1', 3,3'-tetraphenyl-5,5'-p-phenylenedipyrazole. (Author)

AD-467 482 **Field 7D, 20J**
CFSTI Prices: HC$1.60 MF$0.50
Brandeis Univ., Waltham, Mass. Dept. of Chemistry.
CONTINUOUS REPRESENTATIONS IN THE STATISTICAL THEORY OF ELECTRONIC ENERGIES. THE H2 ; ION,
by George S. Handler and Sidney Golden. 1965, 18p Technical rept. TR-15
Contract Nonr-1677 (01),
Proj. NR-051-362
Prepared in cooperation with California Univ., San Diego, La Jolla. Dept. of Chemistry.

Descriptors: (*Atomic energy levels, Hydrogen), (*Hydrogen, Atomic energy levels), (*Statistical mechanics, Atomic energy levels), Ions, Electrons, Hamiltonian, Statistical analysis, Nuclear binding energy.

A version of the statistical theory of electronic energies, arising from a consideration of alternative partitionings of the Hamiltonian, has been applied to the H2 (;) ion, yielding electronic energies approximately 6% greater in magnitude than the exact theoretical values at several values of the internuclear separation. The binding energy at the theoretical equilibrium separation was calculated to be 0.1024 a. u. compared to the experimental value of 0.1026 a. u. (Author)

AD-467 534 **Field 7C**
CFSTI Prices: HC$1.60 MF$0.50
Stanford Research Inst., Menlo Park, Calif.
VAPOR-PHASE REACTIONS OF ORGANIC COMPOUNDS WITH OXYGEN.
Annual rept. no. 2, 20 Jun 64-21 Jun 65,
by Theodore Mill and Frank R. Mayo. 19 Jul 65, 18p
Contract DA-18-AMC-202 (A),
Proj. SRI-PAU-4549

Descriptors: (*Alkanes, Oxidation), (*Cyclopentenes, Oxidation), (*Oxidation, Phase studies), Butane, Cyclo pentanes, Peroxides, Catalysts, Synthesis (Chemistry), Reaction kinetics, Vapors, Hydroperoxides, Acetates, Esters, Chlorine compounds, Hydrogen compounds, Chlorides, Alcohols, Ketones, Oxides, O-heterocyclic compounds, Chromatographic analysis, Butanols, Chemical bonds, Energy, Aliphatic compounds, Hydrocarbons.

A series of gas-phase oxidations with 0.03 M cyclopentene, at 100 degrees, using di-t-butyl peroxide initiator, gave a 30% yield of volatile products at 3% conversion. The volatile products contained 29% cyclopentenyl hydroperoxide, 34% cyclopentenol, 23% cyclopentenone, and 13% cyclopentene oxide. Liquid-phase oxidations of cyclopentene at 100 degrees as 0.1, 1.0, and 5.7 molar solutions in chlorobenzene at 8-22% conversion gave 50-60% volatile products, containing about 68% hydroperoxide, 23% epoxide, 5% ketone, and 3% alcohol. An oxygen pressure effect may be responsible for more epoxide in solution runs than in neat cyclopentene oxidations at 50 degrees. For unknown reasons, liquid-phase oxidations of cyclopentene are three to twenty times as fast as gas-phase oxidations. (Author)

AD-470 571 **Field 7C, 15B**
CFSTI Prices: HC$5.60 MF$0.50
Ash Stevens, Inc., Detroit, Mich.
ALKYLATION OF BIOLOGICALLY ACTIVE PHOSPHONIC ACIDS.
Final comprehensive rept.,
by A. B. Ash, P. Blumbergs, C. L. Stevens, andA. R. Shah. Aug 65, 58p
Contract DA-18-108-AMC-262A

Descriptors: (*Phosphonic acids, Alkylation), (*Alkylation, Phosphonic acids), (*Cholinesterase inhibitors, Synthesis (Chemistry), Ammonium com pounds, Sulfonates, Perchlorates, Pyridines, Organic sulfur compounds, Nitrates, Identification, Nuclear magnetic resonance, ph, Reaction kinetics, Water, Organic solvents, Ketones.

Patent 3,229,565 **Field 7C**
OPTICAL COLORIMETRIC COMPARISON DEVICE.
Patent assigned to Navy,
by Achille Silvestri. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Colorimetric analysis, Water), (*Optical instruments, Colorimetric analysis), Patents, Feedwater.

The device is for the visual colorimetric testing of boiler water for pH or phosphate content. The structure includes a housing or holder which has a mounting for a transparent rectangular container or comparison cell that is divided by a transparent transverse wall into two triangular or trapezoidal compartments, each of which receives a different colored 'standard' liquid. The housing also includes a lamp providing a ray of light that passes through the liquids in both compartments. By sliding the container relative to the light source, the light shines through different lengths of the colored liquids, thereby providing a blend color on a continuous spectrum that varies from an end color that is the color of the liquid in one compartment to an end color that is the color of the liquid in the other compartment. The housing also has a mounting for receiving a test cell for a sample of the liquid

undergoing test. A light ray also passes in a separate path through the test cell.

Patent 3,230,212 **Field 7C, 11I**
CROSS-LINKED CELLULOSIC POLYMER.
Patent assigned to Navy,
by Frederick A. H. Rice. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Cellulosic plastics, Synthesis (Chemistry)), Polymers, Cellulose, Carboxylic acids, Aldehydes, Ketones.

Cellulose material is oxidized to form carboxylic acid groups and functional groups consisting of aldehydes and ketones in the molecule of the material and selectively reducing the groups to the alcohol to obtain a product containing hydroxyl and carboxylic acid groups. This product is treated with thionyl chloride to form the acid chloride and the product is reacted with a polyfunctional compound and polyamine compounds to cross-link the product therewith.

PB-169 349 **Field 7B**
CFSTI Prices: HC$4.60 MF$0.50
Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
ETUDE POLAROGRAPHIQUE DE Cd (II), Pb (II), Hg (I) DANS L'ACIDE ACETIQUE ANHYDRE (Polarographic Study of Cd (II), Pb (II), Hg (I) in Anhydrous Acetic Acid),
by Marie-Claire Conesa-Botta. Jan 66, 50p
CEA-R-2903
Text in French; Attached Summary in English.

Descriptors: (*Cadmium, Polarographic analysis), (*Lead, Polarographic analysis), (*Mercury compounds, Complex compounds), Acetic acids, Anhydrides, Halides, Reduction (Chemistry), Perchlorates, France.

The polarographic method was employed for the study of the acetic complexes of cadmium (II) and lead (II). Also, evidence is presented that mercurous halides are formed in acetic anhydride, and efforts to determine their stability are described.

PB-169 350 **Field 7E**
CFSTI Prices: HC$3.60 MF$0.50
Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
L'EFFET MOSSB AUER ET SES APPLICATIONS A LA CHIMIE (The Mossbauer Effect and its Applications in Chemistry),
by Alain Coulon. Jan 66, 39p CEA-R-2892
Text in French; Attached Summary in English.

Descriptors: (*Mossbauer effect, Chemistry), (*Chemical analysis, Mossbauer effect), (*Radiation chemistry, Mossbauer effect), Reviews, Radioactive isotopes, Nuclear spins, Gamma emission, Resonance absorption, Doppler effect, Nuclear energy levels, Theory, France.

When certain emitting and absorbing nuclei are embedded in identical crystal lattices, resonant absorption of gamma photons, emitted during a nuclear spin transition, takes place. Part of the emission and absorption of gamma photon becomes recoilless. The width of the spectral lines are normal. A relative movement of the source and the absorber changes the frequency (Doppler effect) and allows, by searching the resonance, to show very small changes in the levels of nuclear energy due to: (1) the electronic environment (isomeric shift); (2) the action of an internal electric field (quadrupolar splitting); and (3) the action of a magnetic field (nuclear Zeeman effect). This introductory study of the Mossbauer effect formulates a simplified theory of the phenomenon and its applications to chemistry through a few examples. (Author)

PB-169 351 **Field 7D, 20J, 20H,**
CFSTI Prices: HC$5.60 MF$0.50
Commissariat a l'Energie Atomique, Fontenay-AuxRoses (France). Centre d'Etudes Nucleaires.
DEPLACEMENT ET INTENSITE DES COMPOSANTES DES RAIES DE L'ATOME D'HYDROGENE SOUMIS A UN CHAMP ELECTRIQUE ET UN CHAMP MAGNETIQUE EXTERIEUR UNIFORMES (Displacement and Intensity of the Components of the Lines of the Hydrogen Atom Subjected to Constant External Electrical and Magnetic Fields),
by Louis Herman, Hoe Nguyen, Hans-Werner Drawin, Basile Petropoulos and Claude Deutsch.
Dec 65, 56p CEA-R-2913
EUR 2604-f
Text in French; Attached Summary in English.

Descriptors: (*Hydrogen, Line spectrum), (*Line spectrum, Hydrogen), Electric fields, Magnetic fields, Wave functions, Perturbation theory, Numerical analysis, Plasma medium, Spectroscopy, Stark effect, France.

The wave equation for the hydrogen atom, perturbed by external constant electric and magnetic fields, was solved using the perturbation method, for an arbitrary angle between the two fields. The numerical solution was carriedout on electronic computer. The obtained results were tested using closed form expressions for particular cases, and also using 'total intensity conservation rules'. The most conspicuous features of the deplacement and the intensity changes of the components of the H-alpha line, as a function of the field parameter A and the cosine of the angle between the two perturbing fields, are illustrated by some figures and a set of tables. (Author)

PB-169 353 **Field 7E, 18G, 7B**
CFSTI Prices: HC$7.60 MF$0.75
Commissariat a l'Energie Atomique, Chusclan (France). Centre de Production de Plutonium de Marcoule.
L'APPLICATION DES PROPRIETES CHIMIQUES DU RUTHENIUM A DES PROCEDES DE DECONTAMINATION (Application of the Chemical Properties of Ruthenium to Decontamination Processes),
by Andre Fontaine and Danielle Berger. Dec 65, 80p CEA-R-2842
Text in French; Attached Summary in English.

Descriptors: (*Radioactive waste, Solvent extraction), (*Ruthenium, Chemical properties), (*Solvent extraction, Ruthenium), Solutions, Nitric acid, Nitrates, Phosphates, Organic phosphorus compounds, Complex compounds, Separation, Oxidation, Chemical precipitation, Evaporation, France, Decontamination.

Identifiers: Tributyl phosphates.

The chemical properties of ruthenium in the form of an aqueous solution of the nitrate and of organic tributylphosphate solution are reviewed. From this data, some known examples are given: they demonstrate the processes of separation or of elimination of ruthenium from radioactive waste. (Author)

PB-169 612 **Field 7D, 20H**
CFSTI Prices: HC$2.60 MF$0.50
Massachusetts Inst. of Tech., Cambridge. Dept. of Geology and Geophysics.
THE USE OF 15 MEV DEUTERONS FOR THE DETERMINATION OF CARBON, OXYGEN, AND SILICON IN SOLID MATERIALS BY RADIOACTIVATION ANALYSIS.
Progress rept.,
by John W. Winchester. 26 Oct 60, 29p
Grant NSF-G 6066

Descriptors: (*Radioactivation analysis, Deuteron bombardment), (*Deuteron bombardment, Radioactivation analysis), Carbon, Oxygen, Silicon, Refractory materials, Deuteron reactions.

Experiments have been carried out to test the feasibility of radioactivation analysis for carbon, oxygen, and silicon using 15 m.e.v. deuterons from the M.I.T. Cyclotron. Samples were bombarded on a stationary target placed in the external beam of the Cyclotron, and induced 10 min. N (13), 112 min. F (18), and 157 min. Si (31) were measured by counting positron annihiliation gamma radiation and beta radiation in a scintillation spectrometer and an end-window proportional counter. As low as 0.01% C in SiO2 may be detected without chemical separation by gamma decay curve resolution, and above 0.1% C the precision of replicate samples bombarded at the same time is a few per cent. The stoichiometry of SiO2 may be determined to a precision of a few percent by simultaneous beta and gamma counting of the bombarded sample. Detection of trace oxygen in materials by cyclotron bombardment in general requires chemical separation of induced 112 min. F (18) radioactivity. (Author)

PB-169 681 **Field 7D, 11F, 7B**
CFSTI Prices: HC$3.00 MF$0.75
Bureau of Mines, Washington, D. C.
THERMODYNAMIC PROPERTIES OF VANADIUM AND ITS COMPOUNDS.
Rept. of investigations,
by Alla D. Mah. 1966, 95p RI-6727

Descriptors: (*Vanadium, Thermodynamics), (*Vana dium compounds, Thermodynamics), (*Thermodynamic, Vanadium), Tables, Oxides, Carbides, Nitrides, Calcium compounds, Vanadates, Iron compounds, Lead com pounds, Magnesium compounds, Manganese compounds, Ammonium compounds, Sodium compounds, Bromides, Chlorides, Fluorides, Thermal properties, Transition temperature, Vapor pressure.

Thermodynamic data for vanadium and its inorganic compounds have been critically surveyed, selected, and compiled. The subject matter is divided into three main sections. The first summarizes basic metallurgical thermodynamic data for vanadium and its compounds. Included are heat capacities, entropies, heat contents, heats of vaporization, free energies of vaporization, vapor pressures, temperatures of phase changes, heats of phase changes, heats of formation, and free energies of formation. The second section, application of the basic data, contains heats, free energies, equilibrium pressures, and equilibrium constants of reactions of vanadium compounds with special emphasis on metallurgical reactions. The third section supplies basic thermodynamic data for elements and compounds associated with metallurgical reactions of vanadium. Sufficient auxiliary data has been included so that the calculated values contained in this paper may be followed or new calculations made for related metallurgical reactions.

8. EARTH SCIENCES AND OCEANOGRAPHY

AD-406 895 **Field 8K, 9B**
CFSTI Price: HC$18.50
Texas Instruments Inc., Dallas.
DIGITAL SEISMOGRAPH SYSTEM.
Final rept.,
by Bruce M. Williams. 29 Mar 63, 189p
Contract AF 19 (628)-472, ARPA order-180-61 amend. 2,
Proj. AF-8652,
Task 865205

Descriptors: (*Seismographs, Digital systems), (*Digital systems, Seismographs), Data processing systems, Frequency modulation, Magnetic tape, Digital computers.

AD-471 325 **Field 8M, 20A**
CFSTI Prices: HC$3.00 MF$0.75
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
ULTRASONIC SHEAR WAVE VELOCITIES IN SAND AND CLAY.
Soils Publication No. 175. Report no. 23 on The Response of Soils to Dynamic Loadings,
by Frederick V. Lawrence, Jr. Jan 65, 61p Research rept. R65-05
Contract DA-22-079-eng-224

Descriptors: (*Soil mechanics, Acoustics), (*Acoustics, Soil mechanics), (*Sand, Acoustics), (*Clay, Acoustics), Mechanical waves, Ultrasonic radiation, Propagation, Hydrostatic pressure, Shear stresses, Civil engineering.

Herein is described a study in which the ultrasonic shear wave velocity was measured in sand and clay. The use of the shear wave, rather than the longitudinal wave, offers the possibility of studying stress wave propagation through the skeleton of a soil independently of the pore fluid. The apparatus developed used ferreoelectric ceramics to produce and receive a pulsed, torsional shear wave in cylindrical soil samples subjected to various states of hydrostatic stress. Three soil materials were tested: a coarse, rounded sand, and two types of saturated clay. From the tests on sand it was found that the void ratio and level of effective hydrostatic stress determined the velocity of the shear wave; whereas, the level of shear stress and degree of saturation were found to have only a minor influence. From the tests involving clay samples, it was found that the effective hydrostatic stress and the void ratio most heavily influenced the shear wave velocity, and the three quantities could be interrelated such that specifying any two would determine the third. Measurements taken during secondary consolidation indicate that the shear wave velocity is sensitive to small structural changes occurring during that period. (Author)

PB-169 639 **Field 8A, 6C**
CFSTI Prices: HC$4.00 MF$0.75
Pacific Oceanographic Group, Nanaimo (British Columbia).
SEASONAL AND ANNUAL VARIATIONS OF NET ZOOPLANKTON AT OCEAN STATION P 1956-1964,
by R. J. LeBrasseur. 25 Jan 65, 104p
FRBC Manuscript (O/L)-202

Descriptors: (*Plankton, Pacific Ocean), (*Pacific Ocean, Plankton), Marine biology, Ecology, Periodic variations.

Analyses of zooplankton samples collected at Ocean Station P (Lat. 50 degrees N, Long. 145 degrees W) during the period August 24, 1956 to December 12, 1964 are reported. These observations provide a monitor of the standing crop of net zooplankton at a mid ocean position. With this information the timing and magnitude of seasonal and annual changes in standing crop may be examined in association with various oceanographic and fisheries observations. Other studies, such as the significance of one position sampling versus synoptic surveys and the life histories of oceanic species also may be determined.

PB-169 669 **Field 8L**
CFSTI Prices: HC$9.60 MF$0.75
Wisconsin Univ., Madison. Geophysical and Polar Research Center.
SUMMARY AND DISCUSSION OF SURVEY CONTROL FOR ICE FLOW STUDIES ON ROOSEVELT ISLAND, ANTARCTICA,
by James L. Clapp. Nov 65, 100p Research rept. RR-65-1

Descriptors: (*Glaciers, Rheology), (*Rheology, Glaciers), (*Ice islands, Rheology), Mapping, Surveying, Antarctic regions.

The engineering results of the 1961-62, 1962-63 investigations upon Roosevelt Island, Antarctica are presented with interpretation and conclusions. First, the methods employed to establish absolute horizontal and vertical control on 351 points distributed over the surface of the ice cap are described and results given. The probable error in the horizontal position of these points was plus or minus 0.5 min of latitude and plus or minus 2.0 min of longitude. The probable error in their vertical position was plus or minus 3.5 meters. Second, the methods employed to establish relative horizontal and vertical control on a strain rate network consisting of 102 control points covering a span of approximately 70 km are described and results given. The maximum probable error in the horizontal location of a control point was plus or minus 0.33 meters. The maximum probable error in the vertical location of a control point was plus or minus 92 cm. Third, strain rates and relative displacements are presented for 86 lines representing an area from the crest of the ice cap to the southwest edge. The strain rates and the displacements parallel to the fall line are greater than those perpendicular to the fall line. The strain rates and displacements tend to increase as the distance from the crest of the ice cap increases. (Author)

PB-169 670 **Field 8G, 6R, 6F, 8H**
CFSTI Prices: HC$3.00 MF$0.75
Public Health Service, Washington, D. C. Div. of Radiological Health.
STUDIES OF THE FATE OF CERTAIN RADIONUCLIDES IN ESTUARINE AND OTHER AQUATIC ENVIRONMENTS.
Environmental health series,
by Julius J. Sabo and Paul H. Bedrosian. May 63, 85p
PHS Pub-999-R-3

Descriptors: (*Radioactive waste, Rivers), (*Marine biology, Radioactive waste), (*Estuaries, Radiological contamination), Radioactive isotopes, Rivers, Radiation effects, Ecology, Health physics, Health physics instru mentation, Hydrodynamics, Silt, Sedimentation, Salinity, Radiation monitors, Symposia.

In a symposium on the fate of radionuclides in the Savannah River Estuary and in two river systems, procedures are described which can usefully be applied to investigations of other aquatic systems. The studies involve surveillance and monitoring techniques and the development of equipment and methods. A discussion of the hydraulics of the Savannah Estuary describes the characteristics of river and tidal currents and distribution of salinity and sedimentation; these form a basis for effective sampling and interpretation of radiological data and their application to aquatic and ecological data and their application to aquatic and ecological studies. Field and laboratory studies on the accumulation of nuclides by organisms are described and interrelated. It is shown that more useful information can be developed when specific nuclides, rather than gross activity, are investigated. Improvements in sampling methods, especially in silt collection, are described in detail. These studies emphasize the multidisciplinary aspects of radiological surveys of aquatic environments. (Author)

PB-169 682 **Field 8I**
CFSTI Prices: HC$2.00 MF$0.50
Bureau of Mines, Washington, D. C.
APPLICATION OF STATISTICAL ANALYSIS IN EVALUATING BEDDED DEPOSITS OF VARIABLE THICKNESS-FLORIDA PHOSPHATE DATA.
Rept. of investigations,
by R. D. Berkenkotter. 1964, 43p RI-6526

Descriptors: (*Geophysical prospecting, Statistical analysis), (*Statistical analysis, Geophysical prospect ing), Florida, Phosphates, Minerals, Thickness, Mining engineering, Strategraphy.

This report describes a weighted method for evaluating the mean and variance of assay data from samples of different length. The method, which produces unbiased estimates from which valid confidence limits can be computed, is appropriate for bedded deposits of variable bed thickness and for vein deposits of variablev ein width. Assay data from the bedded Florida phosphate deposit is used to illustrate the procedure. (Author)

PB-169 683 **Field 8I**
CFSTI Prices: HC$1.00 MF$0.50
Bureau of Mines, Washington, D. C.
USE OF POLYESTER-TYPE RESIN TO STABILIZE FRACTURED ROCK.
Progress rept., rept. of investigations,
by Richard H. Oitto, Jr. 1965, 20p RI-6626

Descriptors: (*Rock (Geology), Stabilization), (*Polyester plastics, Mining engineering), (*Mining engineering, Stabilization systems), Fracture (Mechanics), Reinforcing materials, Impregnation, Maintenance, Walls.

A polyester-type resin and deformed-steel reinforcing bars (rebars) were used in combination to strengthen and to stabilize bolted, fractured wall rock along passageways in a western gold mine. Reinforcing bars were placed in boreholes drilled into fractured rock and then were surrounded by resin pumped under pressure into the holes and intersecting fractures until the wall rock was thoroughly impregnated. Pumping and injection equipment and infusion procedures are described. Visual examinations for movement in bonded and adjacent unbonded rock were made for 3 years. Fractured walls containing resin-rebar installations were strengthened. The results suggest that resin-rebar support can be used advantageously and economically in repairing fractured or broken rock when compared with rock bolting or timbering. (Author)

PB-169 685 **Field 8I, 5A**
CFSTI Prices: HC$4.00 MF$0.75
Bureau of Mines, Washington, D. C.
BLOCK-CAVING COPPER MINING METHODS AND COSTS AT THE MIAMI MINE, MIAMI COPPER COMPANY, GILA COUNTY, ARIZ.
Information circular,
by W. R. Hardwick. 1965, 103p IC-8271

Descriptors: (*Copper, Mining engineering), (*Mining engineering, Copper), Costs, Arizonia, Manufacturing methods, Management engineering, Ores (Metal sources), Wages, Safety, Ventilation, Power supplies, Water supplies, Separation.

Identifiers: Block caving.

This Information Circular describes the development of block-caving methods and practices by the Miami Copper Co. at the Miami mine in Gila County, Arizona. It is one of a series published by the Bureau of Mines on mining methods, practices, and costs in various mining districts of the United States. This report gives a history of the district and outlines early prospecting and exploration including methods of sampling and estimation of ore tonnage and value at the Miami mine. Early mining methods are described, particularly those that influenced developments in the caving method. Mine exploration, development, and operating methods for block caving are described with particular attention to those factors, physical, economic, engineering, and managerial that have improved efficiency in the mining operations over a long productive period. Extraction, ventilation, wage system, safety, water supply, power plant, and shop facilities are discussed. The last section gives a brief summary of such costs as are available for publication. (Author)

PB-169 701 **Field 8I, 8G, 5C**
CFSTI Prices: HC$5.00 MF$1.00
Georgia Univ., Athens. Dept. of Geology.
EXPLORATION FOR MINERAL DEPOSITS IN WHITE COUNTY, GEORGIA.
Final rept.
1964, 167p
Contract ARA-Cc-5960
Prepared in cooperation with White County Rede-

velopment Corp. and Inst. of Community and Area Development.

Descriptors: (*Minerals, Georgia), (*Georgia, Mining engineering), (*Gold, Georgia), (*Economic geology, Georgia), Economics, Asbestos, Ores (Metal sources), Gravel, Mica, Mineral products, Quartz, Platinum, Tungsten, Rock (geology).

White County has followed the development pattern of gold mining districts in other parts of the world through the first 3 stages. The County is now ready for the fourth stage: the consolidation of 'worked out', low grade, or scattered holdings, and the commencement of large scale dredging or lode operations. Characteristically, the fourth stage is the most productive. In the major districts, more ore was discovered during large scale development than was known before systematic development began. This report shows (1) where gold has been mined; (2) where there are known auriferous gravels which have not been mined; (3) where there are high-volume gravels which might be auriferous; and (4) the location and size of outcropping veins. The volume and grade of gravels in the Nacoochee Valley, Sautee Creek, Bean Creek, and Dukes Creek warrant a dredging operation. Smaller volumes of gravel at other places are rich enough to be worked with sluices. Of the 284 quartz veins that have been sampled and assayed, 38 contain gold. Several veins are workable grade. Three classes of aggregate can be produced: quartzite, stream gravel, and granite gneiss. Other economic minerals which might be worked are asbestos, mica and soapstone. Native platinum and the tungsten ore mineral, scheelite, have been discovered. Location maps and brief descriptions are provided for 19 mineral collecting localities of interest to the hobbyist and tourist. (Author)

PB-169 846 **Field 8G, 11B, 13B**
CFSTI Prices: HC$5.00 MF$1.00
Michigan Technological Univ., Houghton. Inst. of Mineral Research.
THE PROPERTIES OF CHERT AGGREGATES IN RELATION TO THEIR DELETERIOUS EFFECT IN CONCRETE.
Final rept.,
by E. L. Michaels, M. E. Volin, and A. P. Ruotsala. Jul 65, 163p Rept. no. 0255
Proj. R-121
Prepared in cooperation with Michigan State Highway Dept. and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Materials), (*Gravel, Concrete), (*Concrete, Degradation), Michigan, Porosity, Environ mental tests, Particle size, Minerals, Density.

Identifiers: Aggregate (Materials), Chert.

Properties of chert which were thought to have some relation to the durability of concrete were studied and correlated by means of simple and multiple regression analyses. Those properties most closely related to freeze-thaw durability were found to be: effective porosity, 24-hour absorption, pore size less than 5 microns, specific gravity, and appearance. (Author)

PB-169 867 **Field 8M, 13B, 8B, 8G**
CFSTI Prices: HC$3.00 MF$0.75
Maryland Univ., College Park. Dept. of Civil Engineering.
MARYLAND ENGINEERING SOIL STUDY.
Final rept.,
by H. W. Piper. Dec 65, 81p Rept. no. 0409
Prepared in cooperation with Maryland State Roads Commission and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Soils, Maryland), (*Maps, Civil engineering), (*Roads, Soil mechanics), Drainage, Meteorological maps, Terrain, Geology, Tables.

To satisfy the research specification requiring presentation, for the highway soils engineer, of detailed knowledge of surface, subsurface, climatic and materials conditions, six maps were prepared for each county, as follows: (1) Engineering Soil Map and Property Tables; (2) Engineering Geology Map with Supporting Tables; (3) Slope Map; (4) Materials Prospecting Map and Tables; (5) Aggregate Sources Map and Tables; and (6) Drainage Pattern Map. In preparation of the County Engineering Soil Maps, Maryland State Roads Commission soil survey data was used and no field sampling or laboratory tests were made. Engineering Soil Map Unit boundaries were plotted using correlation between the engineering soil survey test results and the county agriculture soil map unit boundaries. Other material confirming this correlation was consulted. Particular emphasis was made to rock in cuts and to material too wet for use. Completing the required mapping is a series of State-wide maps giving climatical and drainage information and miscellaneous mapping at both state-wide and county levels. A complete mapping system is also described which permits reproduction of maps for field use from masters; projection-overlay scale-problem-free planning and design center use; a revision procedure for continuity of the soils knowledge; a key feature in filing, for ready references, - thousands of maps on microfilm in aperture cards. (Author)

9. ELECTRONICS AND ELECTRICAL ENGINEERING

AD-422 346 **Field 9E, 17B**
CFSTI Prices: HC$2.60
Ohio State Univ. Research Foundation, Columbus. Antenna Lab.
STUDY PROGRAM RELATED TO SHIPBOARD ANTENNA SYSTEM ENVIRONMENT.
Interim rept., 7 Sep 62-3 May 63.
1 Jun 63, 30p Rept. no. 1522-3
Contract N123 (953)3166A
N64 31688

Descriptors: (*Radiofrequency interference, Shipborne), (*Communication systems, Shipborne), (*Ship antennas, Radiofrequency interference), High frequency, Signal-to-noise ratio, Radio communication systems, Phased arrays, Radio frequency amplifiers, Mixers (Electronics), Antenna radiation patterns, Oscillators, Phase shifters, Band-pass filters, Phase control devices, Helixes, Gain, Feedback.

This report summarizes work completed thus far on the problems of shipboard communication systems, particularly that of r.f. interference. Three areas are described: (1) the study of phased arrays, low-coupled antennas, and optimum gain arrays, (2) servo-controlled nulling for interchannel interference reduction, (3) field methods for decoupled antennas. (Author)

AD-464 373 **Field 9E, 17B**
CFSTI Prices: HC$3.60
Ohio State Univ. Research Foundation, Columbus. Antenna Lab.
ON THE OPTIMUM GAIN OF UNIFORMLY SPACED ARRAYS OF ISOTROPIC SOURCES OR DIPOLES,
by C. T. Tai. 31 Mar 63, 40p Rept. no. 1522-1
Contract N123 (953)31663A
Study program related to Shipboard Antenna System Environment.

Descriptors: (*Ship antennas, Radio communication systems), (*Dipole antennas, Gain), Antenna lobes, Beams (Electromagnetic), Phase shift, Measurement, Design.

The optimum gain of uniformly spaced arrays of isotropic sources or dipoles is investigated theoretically in this paper. The formulation is processed with the aid of an array matrix. The optimum gain and the corresponding excitation are expressed directly in terms of the elements of the array matrix. (Author)

AD-464 374 **Field 9E, 17B**
CFSTI Prices: HC$6.60
Ohio State Univ. Research Foundation, Columbus. Antenna Lab.
A PHASE-LOCKED RECEIVING ARRAY FOR HIGH-FREQUENCY COMMUNICATIONS USE,
by Dean E. Svoboda. 15 Aug 63, 68p Rept. no. 1522-4
Contract N123 (953)31663A
Study program related to Shipboard Antenna System Environment.

Descriptors: (*Ship antennas, Radio communication systems), (*Phase-locked communication systems, Phased arrays), (*Phased arrays, High frequency), Antenna radiation patterns, Phase control devices, Radio interference, Signal-to-noise ration, Mixers (Electronic), Oscillators, Radio signals, Radiofrequency cadles, Phase shift, Phase-locked systems, Radiofrequency amplifiers, Phase detectors, Band-pass filters, Automatic.

An H. F. receiving array using H. F. combination and automatic phasing through phase-locked loops is discussed. The effects of an interfering signal on automatic phasing and on the overall array performance are considered. An experimental array is described and results of measurement on the array are given. (Author)

AD-464 375 **Field 9E, 17B**
CFSTI Price: HC$3.00
Ohio State Univ. Research Foundation, Columbus. Antenna Lab.
A SERVO-CONTROLLED NULLING SYSTEM FOR REDUCING RADIO FREQUENCY INTERFERENCE,
by James T. Campbell. 23 Aug 63, 59p Rept. no. 1522-5
Contract N123 (953)31663A
Study program related to Shipboard Antenna System Environment.

Descriptors: (*Radiofrequency interference, Shipborne), (*Ship antennas, Radiofrequence interference), (*Radio communication systems, Radio interference), Servo mechanisms, Reduction, Radio receivers, Radio frequency amplifiers, Modulators, Amplitude modulation, Radio transmitters, Band-pass filters, Suppressors, Attenuators, Phase shifters, Phase control devices.

The servo controlled nulling system is analyzed to determine its feasibility as a method of reducing radio frequency interference caused by nearby transmitters. Limitations on the practical form of the system are studied. Experimentation includes the measurement of null depths for low-level interfering signals. (Author)

AD-464 376 **Field 9E, 17B**
CFSTI Price: HC$5.60
Ohio State Univ. Research Foundation, Columbus. Antenna Lab.
STUDY PROGRAM RELATED TO SHIPBOARD ANTENNA SYSTEM ENVIRONMENT.
Final rept., 7 Sep 62-6 Sep 63.
6 Sep 63, 51p Rept. no. 1522-6
Contract N123 (953)31663A

Descriptors: (*Ship antennas, Radio interference), (*Coupled antennas, Radio interference), (*Radio frequency interference, Ship antennas), (*Helical antennas, Ship antennas), (*Spiral antennas, Ship antennas), (*Phased arrays, Ship antennas), Antenna feeds, Conical antennas, Reduction, Antenna radiation patterns, Medium frequency, High frequency, Field theory, Gain, Phase-locked systems, Electronic scanners, Servomechanisms, Antenna configurations.

Contents: (1) Array studies: Phase-Locked Array Implementation for H. F. Reception; Optimum-

Gain Arrays; Low-Coupling Antennas; (2) Reduction of interchannel interference by servo-controlled nulling loop; (3) Field methods for antenna decoupling; (4) Appendix. Field methods for antenna decoupling: The Concept of Normal Modes on a Body; Graphical Two-Port Techniques; and An Experimental Technique to Aid Decoupling Studies.

AD-467 179 **Field 9A**
CFSTI Prices: HC$3.60 MF$0.50
General Electric Research Lab., Schenectady, N. Y.
NEGATIVE-GRID TUBES FOR PHASED ARRAYS.
Quarterly progress rept. no. 7, 1 Jan-31 Mar 65,
by J. E. Beggs and N. T. Lavoo. 31 Mar 65, 38p
Contract DA-36-039-AMC-03215 (E),
Task 1G6-22001-A-055-02-34
Prepared in cooperation with General Electric Co., Owensboro, Ky. Tube Dept.

Descriptors: (*Triodes, Phased arrays), (*Tetrodes, Phased arrays), Ultrahigh frequency, Radiofrequency power, Electric currents, Electron density, Electrical properties, Diodes (Electron tubes), Gain, Radiofrequency pulses, Bandwidth, Molybdenum, Foils, Hafnium, Cavity resonators, Power amplifiers.

Efforts were continued on a program to produce a triode or tetrode capable of providing a cw output of 1000 watts at 50 per cent efficiency at 1300 Mcs. Sixteen L-64 triodes were built, fourteen of which were available for emission studies and measurement of r-f performance. The transconductance values ranged from a minimum of 0.22 mho to 0.7 mho at a plate current of 2 amperes. Fifteen L-65D diodes were made for emission studies and life testing. Up to two hours of stable operation was obtained at a cathode current density of 10 A/cm squared, and up to 1000 hours duration at 1.5 A/cm squared. A gain of 14 db has been obtained from an L-64 triode operating grid pulsed at a power output of 5.7 KW in a 10% bandwidth circuit at 1.3 Gc. The pulse width was 500 micro seconds, the duty cycle was .07, and the plate efficiency was 33.7%. At small-signal levels a number of L-64's have given a gain-bandwidth product in excess of 15 Gc under long pulse conditions. One tube has been operated at 16 db gain with 20% bandwidth. Wider bandwidths appear feasible. (Author)

AD-468 701 **Field 9E, 17B**
CFSTI Prices: HC$6.00 MF$1.25
Ohio State Univ. Research Foundation, Columbus. Antenna Lab.
PATTERN HANDBOOK. VOLUME IV. FAR-FIELD PATTERNS OF A LINEAR ANTENNA RADIATING IN THE PRESENCE OF RECTANGULAR CYLINDERS,
by C. H. Brenner. 1 Aug 65, 210p Rept. no. 1522-14
Contract N123 (953)31663A
Study program related to Shipboard Antenna System Environment.

Descriptors: (*Antenna radiation patterns, Ship antennas), (*Ship antennas, Antenna radiation patterns), (*Handbooks, Antenna radiation patterns), (*Dipole antennas, Ship antennas), Mathematical prediction, Electromagnetic wave reflections, Ship structural components, Cylindrical bodies, Communication equipment, Programming languages, Scattering.

Identifiers: SCATRAN.

The prediction of fields radiated by shipboard antennas is complicated by the presence of parasitically excited superstructure which warps and deteriorates the far-field patterns. If antennas are to be located in some logical manner on the ship, or if the ship design itself is to take account of the primary radiating elements, then some guides must be found to account for the influence of superstructure on antenna patterns. To this end, a handbook has been compiled, giving patterns of a thin, linear, vertical antenna radiating in the presence of cylindrical conducting structures of various cross-sectional shape. The model used to approximate this configuration is that of an infinite line source, representing the dipole, radiating in the presence of an array of thin, infinite wires parallel to each other and outlining the surface of the offending cylindrical structure. Because long distance communication systems aboard ship usually operate at wavelengths between 10 and 100 meters, structures which have rather sizeable physical dimensions are not very large in terms of wavelength. For this reason, only offending structures up to 2 wavelengths on a side are considered.

AD-474 063 **Field 9E, 9C**
CFSTI Prices: HC$2.60 MF$0.50
Stanford Univ., Calif. Stanford Electronics Labs.
APPARENTLY LOSSLESS TIME-VARYING NETWORKS.
Technical rept.,
by B. D. O. Anderson and R. W. Newcomb. Sep 65, 30p Rept. no. 65-1734, SU-SEL-65-094
Grant AF-AFOSR-337-63

Descriptors: (*Networks, Synthesis), (*Transformers, Electrical networks), Capacitors, Electrical engineering, Theorems.

Time-varying multiport transformers with secondary ports terminated in passive time-invariant capacitors are shown to be not necessarily lossless. A theorem is proved giving necessary and sufficient conditions on the transformer turns-ratio for there to be finite energy excitations at the transformer primary producing arbitrary charges on the capacitors. (Author)

AD-474 147 **Field 9A**
CFSTI Prices: HC$5.60 MF$0.50
Rantec Corp., Calabasas, Calif.
INVESTIGATION OF MICROWAVE DIELECTRIC-RESONATOR FILTERS.
Quarterly rept. no. 7, 1 Mar-31 May 65,
by Seymour B. Cohn and Eugene N. Torgow. 28 Jul 65, 56p
Contract DA-36-039-AMC-02267 (E),
Projs. DA-1P6-22001-A-057, Rantec-31625,
Task 1P6-22001-A-057-02

Descriptors: (*Waveguide filters, Dielectrics), (*Dielectrics, Waveguide filters), Microwave equip ment, Resonators, Bandwidth, Equations, Microwave frequency, Configuration, Resonant frequency, Disks, Waveguides.

Waveguide band-stop filters using dielectric resonators are considered. Two basic orientations, transverse and axial, of a dielectric resonator in a TE10-mode rectangular waveguide are analyzed. Formulas for external Q are derived in both cases. The experimental response of a three resonator band-stop filter is shown to agree well with the theoretically anticipated performance. Various configurations of dielectric resonators in waveguide that yield directional filter performance are described. Pairs of resonators operating in their fundamental mode are used as well as a single resonator operating in its second mode of resonance. Formulas are derived for several cases. Measured resonant frequency curves are presented for the first three modes of a disk as a function of length-to-diameter ratio and favorable regions of L/D yielding good mode separation are found for the cases of the first and second modes. Data showing the effect of metal-wall proximity on unloaded Q and resonant frequency are presented for an axially oriented dielectric disk in square and circular tubes below cut-off. (Author)

C13.46:249 **Field 9B, 15C**
CFSTI Price: MF$0.75
National Bureau of Standards, Washington, D. C.
A PROGRAM FOR PLOTTING CIRCLES OF CONSTANT OVERPRESSURE AROUND TARGETED POINTS.
Technical note,
by Mai Liis Joel and Douglas D. Lottridge. 28 Oct 64, 59p NBS-TN-249
Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.40.

Descriptors: (*Programming (Computers), Mapping), Armed forces operations, Communication systems, Site selection.

The Defense Communications Agency is responsible for locating its communications facilities in a manner that will maximize the probability of maintaining communication in the face of nuclear attack. This report describes a program written for the IBM 7094 which produces as its final output one or more tapes to be used as input to a Cal-Comp 570 plotter system. With these tapes the plotter can produce overlays for use with the series of World Aeronautical Charts covering the Continental United States. The overlays comprise circles representing a radius of constant overpressure around the target point of a given nuclear weapon. Based on hypothetical attacks the overlays provide the user with a means of visualizing the hardness required of facilities to survive in particular areas. (Author)

C13.46:259 **Field 9B, 12A**
CFSTI Price: MF$0.75
National Bureau of Standards, Washington, D. C.
A FORTRAN PROGRAM FOR DETERMINING AN EMPIRICAL EXPRESSION FOR A QUANTITY MEASURED AT COMBINATIONS OF SEVERAL OF EACH OF TWO VARIABLES.
Technical note,
by Mary Nan Steel, Frank L. McCrackin, and JohnMandel. 12 Apr 65, 65p NBS-TN-259
Hard copy available from Superintendent of Documents, GPO, Washington, D. C. 20402, $0.40.

Descriptors: (*Programming (Computers), Statistical analysis), (*Statistical analysis, Programming (Computers)), Programming languages.

Identifiers: FORTRAN.

This note relates to a general procedure, reported elsewhere, for finding an empirical expression for the functional dependence of a measured quantity on two variables. The procedure is applicable when measurements of the dependent variable are available at m.n combinations of m levels of one variable and n levels of the other; it leads to an algebraic expression relating the three variables. A Fortran program to perform the various steps of the general procedure is presented along with detailed instructions for its use. The program also includes the calculation of an analysis of variance, of components of variance, of significance tests, tables of residuals, and a number of other quantities. (Author)

C13.46:280 **Field 9C**
CFSTI Price: MF$0.50
National Bureau of Standards, Washington, D. C. Electronic Instrumentation Section.
A PEAK AC-DC VOLTAGE COMPARATOR FOR USE IN A STANDARDS LABORATORY,
by Louis A. Marzetta. 17 Jan 66, 33p
NBS TN-280
Availability: Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.25.

Descriptors: (*Comparators, Voltage), Design, Laboratory equipment, Standards.

An increased availability of high-precision a-c and d-c power sources has allowed routine electrical measurements to be made in the field with a precision previously possible only in the standards laboratory. Ac-dc comparisons are being made on the basis of the peak, rms, and average value of the sine wave source. The peak ac-dc voltage compar-

ator described in this report was developed for use in the standards laboratory to help meet the increasing demand for the certification of new field instruments. The described instrument is capable of establishing the ac-dc error of other peak comparators at frequencies from 50 to 2400 Hz with an imprecision of less than 15 ppm. (Author)

Patent 3,229,296 **Field 9E, 13J**
SUBMARINE-TYPE WHIP ANTENNA DESIGNED FOR FULLY LOADED AND DEFLECTED CONDITION.
Patent assigned to Navy.
by Oliver E. Saari. 11 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Dipole antennas, Submarine antennas), (*Submarine antennas, Dipole antennas), Patents.

The long slender antenna is designed for use on submarines. The whip antenna is under constant stress when moving through the water at high speeds. The antenna has a base which is a cylindrical barrel having a constant diameter. Beginning at the top of the base the whip body has a tapered rod portion. At the end of the rod portion there is a second tapered end portion. The rod portion and end portion are both frustums. The tapers are gradual with no steps. The transition between the base, rod portion and end portion are continuous and smooth with no sharp edges.

Patent 3,229,877 **Field 9B**
METHOD AND APPARATUS FOR STORAGE AND SELECTIVE RETRIEVAL OF MAGNETICALLY RECORDED DATA.
Patent assigned to AIR FORCE.
by John B. McLean and Edward Morenoff. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Data storage systems, Magnetic tape), (*Information retrieval, Data storage systems), Winding, Patents, Reels, Digital computers.

The method is for expediting the retrieval of desired intelligence in a magnetic tape memory system for the storage of data in the form of magnetically retrievable bits of coded intelligence. A plurality of monitoring elements are applied to a series of magnetic tapes at points along the several tapes corresponding to intelligence-containing segments of the tapes. High speed motivation is applied to all the tapes in unison. The high speed motivation of one of the tapes is interrupted whenever a monitoring element on the tape reaches a predetermined position in the operating cycle.

Patent 3,229,941 **Field 9E, 13G**
ANTENNA SUPPORT.
Patent assigned to Army.
by Menahem Suliteanu and William R. LaValley. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Supports, Antenna components), (*Positioning devices (Machinery), Antennas), Patents, Hydraulic jacks, Servomechanisms, Tracking.

The support is for a large antenna used for distant tracking. The structure includes three tripod assemblies. Each of the assemblies include three extendable and retractable legs having discrete rotatable base portions and top ends rotatable in a framework. One end of a plate is rotatable in the framework. An arm is pivotally secured to the plate at its other end and is rotatable relative to the ring support to which the antenna is affixed.

PB-169 036 **Field 9A**
CFSTI Prices: HC$1.00 MF$0.50
Stanford Univ., Calif. Stanford Electronics Lab.
ON RECIPROCITY IN LINEAR TIME-INVARIANT NETWORKS,
by B. D. O. Anderson and R. W. Newcomb. Nov 65, 18p Technical repts. TR-6558-3, SU-SEL-65-101
Grants NSF-GK-237

Descriptors: (*Electrical networks, Linear systems).

A general time-domain definition of reciprocity is given in terms of network port variables, and this definition is applied to conclude the symmetry of network matrices, even in the case of active, nonfinite networks. A new proof is presented of the reciprocity of finite networks composed of time-invariant resistors, capacitors, inductors and transformers, and this proof is also applied to show the reciprocity of interconnections of a wide class of reciprocal networks. (Author)

PB-169 169 **Field 9B, 18K**
CFSTI Prices: HC$5.00 MF$1.25
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
RESOLUTION DE L'EQUATION MUTIGROUPE DE LA DIFFUSION DANS UNE GEOMETRIE A UNE DIMENSION ET CALCULS ANNEXES: CODE MUDE (RESOLUTION OF THE MUTI-GROUP SCATTERING EQUATION IN A ONE-DIMENSIONAL GEOMETRY AND SUBSIDIARY CALCULATIONS: THE MUDE CODE),
by Claude Bore, Yves Dandeu, and ChantalSaint-Amand. Dec 65, 198p CEA-R-2923
Text in French; Attached Summary in English.

Descriptors: (*Programming (Computers), Nuclear scattering), (*Nuclear scattering, Programming (Computers)), Reactor lattice parameters, Neutron transport theory, France.

Identifiers: MUDE.

It resolves a system of difference equations approximating to the one-dimensional multigroup neutron scattering problem. More precisely, this code makes it possible to: Calculate the critical condition of h reactor (k sub eff, critical radius, critical composition) and the corresponding fluxes; Calculate the associated fluxes and various subsidiary results; Carry out perturbation calculations; Study the propagation of fluxes at a distance; Estimate the relative contributions of the cross sections (macroscopic or microscopic); and Study the changes with time of the composition of the reactor. (Author)

PB-169 435 **Field 9A**
CFSTI Price: HC$8.60
Bjorksten Research Labs., Inc. Madison, Wis.
TRANSMISSION LINES HAVING STRONG RF ATTENUATION. ANALYSIS AND DESIGN PROCEDURES.
Final rept.,
by D. G. Holinbeck, E. A. Meyer, and E. G. Paquette. 31 Aug 60, 86p
Contract N178-7583
AD 245 960

Descriptors: (*Transmission lines, Attenuation), Radiofrequency, Design, Graphics, Electric conductance, Electric impedance, Resistance (Electrical), Equations, Theory.

The work reported here relates to an investigation of design criteria for transmission lines having a large attenuation, approximately 30 db/ft., for frequencies above 20 kc. and a negligible attenuation for frequencies below 20 kc. Since the attenuation of a transmission line is dependent upon several quantities, a specified attenuation can, in principle, be achieved with many different combinations of these quantities. Emphasis has therefore been placed upon graphical methods for displaying all combinations of applicable parameters that will give a specified attenuation. In many instances not only the attenuation of a transmission line will be of interest, but its characteristic impedance and the wavelength of waves on it will also be of interest. Because of this, graphical methods for displaying characteristic impedance and wavelength information have also received attention.

PB-169 575 **Field 9E, 9C**
CFSTI Price: HC$50.50
Stanford Research Inst., Menlo Park, Calif.
DESIGN CRITERIA FOR MICROWAVE FILTERS AND COUPLING STRUCTURES.
Final rept.,
by G. L. Matthaei, P. S. Carter, Jr., C. C. Flammer, S. B. Cohn, and W. J. Getsinger. Jan 61, 509p
Contract DA-36 (039)-sc-74862,
Projs. DA-3-26-01-001, SRI-2326
AD 255 509

Descriptors: (*Microwave equipment, Filters (Electro magnetic wave), (*Filters (Electromagnetic wave), Microwave equipment), (*Coupling circuits, Microwave equipment), Waveguide filters, Low pass filters, Band pass filters, Radiofrequency filters, High pass filters, Printed circuits, Switching circuits, Experimental design, Mathematical analysis.

Research was concerned, both theoretically and experimentally, with new types of microwave filters and coupling structures, and with developing more precise methods of design for various previously known structures. Among the structures discussed are a wide-band, strip-line, Magic-T; a ferrite-loaded nonreciprocal TEM-mode structure for wide-band gyrator and isolator applications; and two types of forward-coupling hybrid junction, one in strip-line and one in trough guide. Design data are presented for broadside-coupled strip transmission lines, and for an interleaving, printed-circuit, parallel-coupled, strip-transmission-line construction. Design theory and experimental results are presented for a type of waveguide filter having unusually broad stop bands. A generalized description is given of Cohn's method for design of direct-coupled, band-pass filters. A method is presented for the design of wide-band, band-pass filters from lumped-element, low-pass prototypes. A mathematical study was made of the design of diplexers. The effects of dissipation loss in filters are presented. The use is discussed of pumped, variable-capacitance diodes in up-converters to form filters whose band-pass frequency is controlled by a voltage-tunable pump oscillator. Lumped-element, low-pass prototype data are given for impedance-matching networks. (Author)

10. ENERGY CONVERSION (NON-PROPULSIVE)

PB-169 636 **Field 10B, 20I, 20C, 7D**
CFSTI Price: HC$13.60
Massachusetts Inst. of Tech., Cambridge. Electronic Systems Lab.
STUDY OF ELECTRICAL ENERGY CONVERSION SYSTEMS FOR FUTURE AIRCRAFT.
Summary rept.,
by H. H. Woodson and W. D. Jackson. 1 Feb 60, 138p
Contract AF 33 (616)-3984,
Proj. AF-8149,
Task 61098
WADD TR-60-148,
AD 243 592

Descriptors: (*Energy conversion, Air force research), (*Electric power production, Aircraft), Magneto hydrodynamics, Electromechanical converters, Thermoelectricity, Electrochemistry, Liquids, Gases, Compressible flow, Incompressible flow.

Energy-conversion studies in progress in the fields of magnetohydrodynamics and electromechanics are summarized, and work completed both in these fields and in thermoelectric and electrochemical energy conversion is briefly described.

11. MATERIALS

AD-274 513 **Field 11F**
CFSTI Price: HC$4.60
Climax Molybdenum Co. of Michigan, Detroit.
RESEARCH AND DEVELOPMENT ON NEW PROCESSES OF PRODUCING DUCTILE MOLYBDENUM.
Summary rept. 1 Nov 60-31 Oct 61,
by William G. Scholz and A. Phillip Coldren. 2 Apr 62, 44p
Contract NOrd-15915

Descriptors: (*Molybdenum, Manufacturing methods), Zone melting, Dissociation, Molybdenum compounds, Sulfides, Powder metals, Transition temperature, Brittleness, Hardness, Degasifaction, Purification, Vacuum apparatus, Ductility, Vacuum furnaces, Refining (Metallurgy).

AD-274 530 **Field 11D, 11E**
CFSTI Price: HC$17.30
Owens-Corning Fiberglass Corp., Granville, Ohio.
INVESTIGATIONS OF GLASS FIBER-METAL COMPOSITE MATERIALS.
Final rept. 15 Mar 55-31 Oct 60,
by P. A. Lockwood. 30 Nov 60, 177p
Contract NOrd-15764

Descriptors: (*Composite materials, Glass textiles), (*Glass textiles, Reinforcing materials), (*Metals, Composite materials), Aluminum, Zinc, Stainless steel, Casting, Metal coatings, Powder metallurgy, Mechanical properties, Lead, Theory, Aluminum alloys.

The basic objectives of this research work were to determine methods by which various metals and alloys could be combined with fibers or flakes of glass, to determine the properties of the samples that were produced, and finally to determine the mechanisms by which the glass fibers influence or modify the behavior of metals.

AD-406 794 **Field 11F, 20B**
CFSTI Price: HC$50.90
Aeronautical Systems Div. Air Force Systems Command, Wright-Patterson AFB, Ohio.
SYMPOSIUM ON THE ROLE OF SUBSTRUCTURE IN THE MECHANICAL BEHAVIOR OF METALS.
Technical documentary rept.,
by I. Perlmutter. Apr 63, 513p ASD-TDR-63-324
Proj. AF-7351,
Task 735101

Descriptors: (*Crystal substructure, Metals), (*Mechanical properties, Crystal substructure), (*Metallurgy, Crystal substructure), Symposia, Deformation, Recovery, Recrystallization, Fracture (Mechanics), Transformations, Heat treatment, Electron microscopy, X-ray diffraction analysis, Microstructure, Phase studies, Metallography.

The papers contained in this technical documentary report were presented at a symposium which dealt with the subject of substructure and its effect on the mechanical properties of metals. The symposium was held in Orlando, Florida on 5-7 December 1962. Both review papers and reports of current research are included. The following general subject areas are covered: experimental techniques for observing and measuring substructure; development of substructure by deformation, recovery, and recrystallization; the role of substructure in yielding, twinning, and fracture; and the role of substructure in transformation and precipitation. (Author)

AD-463 840 **Field 11D, 11F, 13H**
CFSTI Price: HC$3.60
United Aircraft Corp., East Hartford, Conn. Research Labs.
RESEARCH INVESTIGATION OF PHASE-REINFORCED HIGH-TEMPERATURE ALLOYS PRODUCED DIRECTLY FROM A MELT.
Technical rept.,
by F. D. Lemkey and M. J. Salkind. 15 Apr 65, 35p Rept. no. D910261-3
Contract DA-19-020-AMC-00434 (X),
Proj. DA-1A024401A111
AMRA CR-64-05/1,
N65 17482

Descriptors: (*Composite materials, Fiber metallurgy), (*Whiskers (Crystals), Reinforcing materials), (*Fiber metallurgy, Heat resistant metals + alloys), (*Heat resistant metals + alloys, Fiber metallurgy), Eutectics, Zone melting, Tantalum, Tantalum compounds, Carbides, Nickel, Nickel compounds, Phase studies, Nickel alloys, Beryllium alloys, Mechanical properties, Single crystals, Intermetallic compounds, Solid solutions.

The results of continued investigations on whisker-reinforced high temperature eutectic alloys are presented in this third quarterly report. Ingots of Ta-Ta2C have been unidirectionally solidified at 15 cm/hr to produce a composite of aligned tantalum carbide rods and platelets within a matrix of tantalum using a modified electron beam zone melting apparatus. A consistent crystallographic relationship between Ni and NiBe interpenetrating single crystal lamellae of a eutectic grain has been examined in detail using a hard sphere atomistic model of the interface. The results of a study of cyclically loaded Ni-NiBe eutectic alloy has indicated that most of the deformation takes place within the nickel solid solution matrix. The yield strength increased with each cycle and reached a constant maximum value after four cycles. (Author)

Patent 3,229,635 **Field 11A, 21H**
ROCKET NOZZLE DIAPHRAGM SEAL.
Patent assigned to Navy,
by George K. Oss. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Seals (Stoppers), Rocket motor nozzles), (*Diaphrams (Mechanical), Seals (Stoppers)), Patents.

The elastic diaphragm type seal fits over the nozzle of a rocket motor to effectively seal the rocket nozzle against an exterior predetermined pressure and to rupture upon the build-up of internal pressure within the nozzle. The diaphragm has an O-shaped rim which engages the outer surface of the nozzle.

Patent 3,229,787 **Field 11H, 14C**
OILER FOR ROTARY DRUMS.
Patent assigned to Navy,
by Rodney F. Henley. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Lubrication, Magnetic recording systems), Patents, Cylindrical bodies, Reels, Films, Oils.

The oiler applies a thin coat of oil to magnetic recording drums. A rockable wick retaining structure loosely yet securely holds a tapered felt wick in line contact with the rotating recording band while applying a light adjustably controllable pressure to the wick. This light line contact provides for equal lubrication of the comparatively irregular surface of the molded recording bands.

Patent 3,230,053 **Field 11B, 20B**
APPARATUS FOR PRODUCING HIGH PURITY SILICON CARBIDE CRYSTALS.
Patent assigned to NASA,
by Noel T. Wakelyn and Robert A. Jewell. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Crystal growth, Silicon compounds), (*Silicon compounds, Carbides), Patents, Purification.

The silicon carbide crystals are used in the manufacture of high temperature semiconductors. Apparatus is provided whereby a hydrogen gas may be saturated with silicon tetrachloride and flowed under pressure through a constricted passageway within a high temperature furnace, onto a carbonaceous base or model member. The carbonaceous member extends forward and aft of the constricted furnace area with silicon carbide crystal formation taking place in large quantity on the carbon model only on the portion thereof positioned aft of the constricted gaseous passageway.

Patent 3,230,080 **Field 11F**
COBALT BASE ALLOYS CONTAINING TITANIUM.
Patent assigned to Navy,
by John J. Rausch and Joseph B. McAndrew. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Cobalt alloys, Titanium alloys), Patents, Niobium alloys.

The forgeable high-strength alloy is useful in nuclear, missile and space technologies. It consists of 1 to 10 weight percent of titanium, 1 percent columbium and cobalt.

PB-169 298 **Field 11D**
CFSTI Prices: HC$1.00 MF$0.50
Department of Forestry, Ottawa (Ontario).
THE DEVELOPMENT OF THE GRADE MARKING OF LUMBER IN CANADA,
by J. H. Jenkins. Sep 65, 16p DF-1134
Text in English; Attached Summary in French.

Descriptors: (*Wood, Standards), Quality control, History, Law, Canada.

The grade marking of lumber in Canada has been in effect since 1960. During this period, there have been many important changes and developments. The report therefore is divided into two parts. The first provides a history of the organization established to organize and control grade marking lumber for Canadian and U. S. requirements. The second part describes the present status of grade marking in Canada -- the regulations and organization now in effect. (Author)

PB-169 300 **Field 11L, 13D, 11D**
CFSTI Prices: HC$2.00 MF$0.50
Forest Products Lab., Madison, Wis.
FIBERNEER DEVELOPMENT, PRODUCTION, AND EVALUATION.
Research paper,
by Robert S. Kurtenacker. Jan 66, 30p FPL-52

Descriptors: (*Sandwich construction, Packaging), (*Composite materials, Packaging), (*Packaging materials, Composite materials), Wood, Fiberboard, Mechanical properties, Compressive properties, Tests.

Identifiers: Fiberneer.

Exploratory development and evaluation of a new packaging material called Fiberneer are discussed. The material is a combination of thin wood veneer and conventional paperboard corrugated box components. Early trials to produce a double-wall material indicated its potential, but actual production resulted in crushed flutes. The use of thin veneer overlaid with paper and flexed, permitted a single-wall material to be produced on conventional corrugated combining equipment. The overlaid veneer was utilized as outer facings combined with a conventional semichemical corrugating medium. Evaluation of boxes and rectangular tubes pro-

duced from the material indicates that Fiberneer, either single-wall or double-wall, possesses certain compressive strength and performance characteristics desirable in a container material. (Author)

PB-169 302 **Field 11L, 11A**
CFSTI Prices: HC$1.00 MF$0.50
Forest Products Lab., Madison, Wis.
PRELIMINARY STUDY OF THE GLUING OF AMMONIUM SALT-TREATED WOOD WITH RESORCINOL-RESIN GLUES.
Research note,
by R. E. Schaeffer. Jan 66, 14p FPL-0112

Descriptors: (*Wood, Bonding), (*Adhesives, Effectiveness), (*Joints, Strength), Laminates, Joining, Fire resistant materials, Ammonium compounds, Shear stresses, Failure (Mechanics), Resorcinol, Polymers, Formaldehyde.

Shear strength evaluations were made on birch veneer lap-joint specimens and southern pine block-shear specimens. Ammonium salt-treated wood showed lower joint strength and lower percentages of wood failure than untreated wood. (Author)

PB-169 303 **Field 11L, 11K**
CFSTI Prices: HC$1.00 MF$0.50
Forest Products Lab., Madison, Wis.
SAWDUST FLOOR-SWEEPING COMPOUNDS.
Research note.
Jan 66, 4p FPL-0115
Slight revision of Report no. 1666-14.

Descriptors: (*Wood, Cleaning compounds), (*Cleaning compounds, Wood), (*Floors, Cleaning compounds), Powders, Preparation.

Identifiers: Sawdust, Sweeping compounds.

A general discussion of the use of sawdust as an absorptive material in floor sweeping is followed by formulas for 5 sweeping compounds, and instructions for their preparation.

PB-169 305 **Field 11L, 13H**
CFSTI Prices: HC$1.00 MF$0.50
Forest Products Lab., Madison, Wis.
WOOD FLOUR.
Research note,
by L. H. Reineke. Jan 66, 13p FPL-0113

Descriptors: (*Wood, Powders), Manufacturing methods, Particle size, Safety, Economics, Costs, Transportation, Specifications, Industrial equipment, Reviews.

Identifiers: Wood Flour.

A review is presented which includes the following topics: uses of wood flour; species used; variations in physical characteristics; general conditions of the industry; sources of raw materials; manufacturing processes; sizing of the product; processing efficiency; plant protection; investment and productive capacity; operating costs; transportation; prices and grades; production; generalized wood flour specifications; grinding and accessory equipment.

PB-169 306 **Field 11L, 13H**
CFSTI Prices: HC$1.00 MF$0.50
Forest Products Lab., Madison, Wis.
VOLUME LOSS FROM INACCURATE SAWING.
Research note,
by L. H. Reineke. Jan 66, 5p FPL-0111

Descriptors: (*Wood, Cutting), (*Saws, Operation), Material forming, Thickness, Errors, Measurement, Volume.

The extent of materials waste resulting from inaccurate sawmill operation is pointed out. Methods for increasing volume yields are explained, as are techniques for rapidly determining excess board thicknesses.

PB-169 307 **Field 11L, 13C, 11D**
CFSTI Prices: HC$1.00 MF$0.50
Forest Products Lab., Madison, Wis.
REACTION OF UNBALANCED PANEL CONSTRUCTION TO SLOW AND RAPID CHANGES IN RELATIVE HUMIDITY.
Research note,
by B. G. Heebink. Jan 66, 9p FPL-0116

Descriptors: (*Sandwich panels, Deformation), (*Panels (Structural, Humidity), (*Laminates, Deforma tion), (*Wood, Panels (Structural)), Moisture, Vapors, Penetration.

A commercial decorative laminate, the recommended backing sheet, and a particle board core were conditioned and assembled to form several panel constructions. The panels were further conditioned and strips were cut from each and subjected to immediate and gradual humidity changes. Whether this type of unbalanced constructions are exposed to gradual or immediate relative humidity changes had little effect on the final degree of warp. An unbalanced construction warps first in one direction followed by a reverse warp to the opposite direction when equilibrium moisture content condition is reached. This reaction is probably caused by a difference in vapor penetration rate into and through the face and back surfaces of the construction.

PB-169 470 **Field 11C, 1C, 5J, 17H**
CFSTI Price: HC$2.60
Applied Psychological Services, Wayne, Pa.
AIRCRAFT DETECTABILITY AND VISIBILITY: I. VISUAL FIELDS FOR FLUORESCENT AND ORDINARY PAINTS,
by Arthur I. Siegel and Kenneth Crain. Aug 60, 29p
Contract N156-38581
NAMC ACEL-440,
AD 245 849

Descriptors: (*Paints, Visibility), (*Aircraft finishes, Visibility), (*Detection, Aircraft finishes), (*Fluores cence, Aircraft finishes), Detection, Vision, Aircraft, Colors, Perception (Psychology), Applied psychology.

This is the first of a series of studies by Applied Psychological Services in collaboration with the Air Crew Equipment Laboratory in which the effective stimulus properties of certain fluorescent pigments (red-orange, yellow-orange, and blue) are compared among themselves and with those of 'matching' ordinary pigments and white. Through visual perimetric methods, two points were measured on each of eight meridians: (1) that point at which the stimulus was first seen, usually as a gray object, as it was brought in from the periphery ('Outside Limits' measurement), and (2) that point at which the true color of the test object could be identified ('Inside Limits' measurement). For the yellow-orange fluorescent and its ordinary color counterpart and for white, only the first of these measurements was made. With respect to the Inside enses, and capital costs were then estimated. Lastly, a financing plant was drawn up and a projection made of anticipated revenue and expenses. It is the conclusion of the study that the plant is feasible. It will provide 55 jobs and a sizeable payroll for the area. The projected growth of the area indicates that the plant will grow and be a stable influence on the economy of the area.

PB-169 605 **Field 11H**
CFSTI Prices: HC$2.00 MF$0.50
Brown and Root, Inc., Houston, Tex.
DEVELOPMENT OF DRILLING FLUID FRICTION ADDITIVES FOR PROJECT MOHOLE,
by J. L. Lummus and B. V. Randall. 13 Jan 64, 38p
Subcontracted to Pan American Petroleum Corp., Tulsa, Okla., Research Dept. Supported in part by NSF.

Descriptors: (*Cutting fluids, Lubricant additives), (*Lubricant additives, Cutting fluids), (*Drilling, Cutting fluids), Seeds, Viscoelasticity, Polymers, Fluids, Rheology, State-of-the-art reviews.

Identifiers: Mohole project, Flax meal.

An extensive literature survey was conducted on viscoelastic fluids, rheology measurements, friction reductions, polymers, and natural gums. A bibliography of these references is included in the Appendix. An apparatus which photographically determines the expansion of emerging jet streams is described. From the amount of jet expansion obtained for a particular fluid, a prediction can be made of viscoelastic properties which, in turn, can be related to friction reduction properties. The apparatus was used in this manner to determine the relative effectiveness of a large number of natural and synthetic polymers for reducing pressure losses in the present Mohole drill string design. The most promising materials, i.e., those having the highest degree of viscoelasticity at various shear rates, were then tested using both small and large scale rheology equipment. The results of these tests showed that (1) flax meal in a concentration of approximately 6 pounds per barrel will reduce the pressure loss incurred when pumping sea water by 50 percent, and (2) RV-13, a product of the Nalco Chemical Company, in a concentration of from 0.2 to 0.5 pounds per barrel will also reduce pressure losses by approximately 50 percent. The flax meal is recommended for drilling where heat stability and resistance to bacterial action are not required characteristics. (Author)

PB-169 631 **Field 11F, 11C, 11I, 11B +**
CFSTI Price: HC$6.60
Ordnance Materials Research Office, Watertown, Mass.
A REVIEW OF MATERIALS RESEARCH FOR 1958 OR THE ORDNANCE MATERIALS RESEARCH OFFICE,
by Irving Kahn and Robert Bechard. Mar 59, 61p Publication no. OMRA-16
AD 212 323

Descriptors: (*Ordnance, Materials), (*Materials, Scientific research), Welding, Abstracts, Ordnance steel, Reviews, Adhesives, Cleaning, Protective treat ments, Fungus deterioration, Non-destructive testing, Coatings, Corrosion, Metals, Heat resistant materials, Packaging, Plastics, Rubber.

PB-169 632 **Field 11F, 11C, 11I, 11B +**
CFSTI Price: HC$5.60
Ordnance Materials Research Office, Watertown, Mass.
A REVIEW OF MATERIALS RESEARCH FOR 1959 OF THE ORDNANCE MATERIALS RESEARCH OFFICE,
by Irving Kahn and Frank S. Hodi. Mar 60, 55p Publication no. OMRO-19
AD 235 054

Descriptors: (*Ordnance, Materials), (*Materials, Scientific research), Welding, Abstracts, Ordnance steel, Reviews, Adhesives, Cleaning, Protective treat ments, Fungus deterioration, Non-destructive testing, Coatings, Corrosion, Metals, Heat resistant materials, Packaging, Plastics, Rubber.

PB-169 838 **Field 11B, 13B, 8G, 13C**
CFSTI Prices: HC$1.00 MF$0.50
Texas Transportation Inst., Texas A and M Univ., College Station.
CORRELATION OF CONCRETE PROPERTIES WITH TESTS FOR CLAY CONTENT OF AGGREGATE,
by Eugene Buth, Don L. Ivey, and Teddy J. Hirsch. Aug 64, 23p RR-71-1, Bulletin-32
Proj. 2-5-63-71
Sponsored by the Texas Highway Dept. in cooperation with Bureau of Public Roads, Washington, D. C. Research project Deleterious Materials in Concrete.

Descriptors: (*Roads, Materials), (*Concrete, Mechanical properties), (*Sand, Clay), (*Clay, Impurities), Texas, Degradation.

Identifiers: Aggregate (Materials).

The presence of clays in fine aggregate is known to be detrimental to the structural properties of concrete. Several methods have been devised to measure the character of such impurities; however, the results obtained do not always agree, nor do they correlate too well with results obtained in the field. Tests by the sand equivalent, liquid limit, and loss by decantation methods indicate good correlation between the sand equivalent and liquid limit tests, and that the liquid limit value is the best indication of the quality of fine aggregate. It was also found that shrinkage of siliceous aggregate concrete increased and strength decreased as the percentage of contaminant was increased. However, the shrinkage of limestone aggregate concrete decreased only slightly, or was constant with addition of contaminant. The nature of the aggregate contaminant was also studied by means of X ray diffraction and ion exchange methods. (Author)

PB-169 842 **Field 11B, 13B**
CFSTI Prices: HC$5.00 MF$1.00
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
DURABILITY OF BRIDGE DECK CONCRETE.
Final annual rept.,
by T. D. Larson and J. J. Malloy. Jan 65, 158p
Rept. no. 0115
Contract PDH-31057
Prepared in cooperation with Pennsylvania State Dept. of Highways and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Materials), (*Concrete, Bridges), (*Bridges, Concrete), Pennsylvania, Performance (Engineering), Civil engineering, Degradation, Failure (Mechanics), Air, Aging (Materials).

This report covers the first years study of durability of bridge deck concrete in Pennsylvania. The specific accomplishments of this investigation were: development of basic equipment for microscopic analysis of air voids and the composition of hardened concrete; completion of field surveys on nine bridge decks showing signs of distress, and a detailed observation of the construction of one bridge deck. For laboratory study, 47 cores were taken from the nine decks. Air determinations on these were compared with the reported field air contents. Petrographic examination was also made on these cores. On one bridge, field observations were made of the placing and curing techniques, and the water and air contents of the concretes. Conclusions of the report are: there is not perfect correlation between air content and field performance of bridge deck concrete; air content appears to be the best indicator of performance of the concrete; petrographic examinations gave indications of possible causes of failure; not enough bridges have been studied to determine relationship between deterioration and factors causing the deterioration; exposure to moisture and de-icer solutions resulting from poor drainage, accelerates deterioration; observation of new construction permits identification of factors which may aid in interpreting bridge deck failures (Author)

PB-169 847 **Field 11B, 13B**
CFSTI Prices: HC$1.00 MF$0.50
California State Div. of Highways.
EFFECTS OF AIR-ENTRAINING AGENTS ON CONCRETE PROPERTIES,
by John L. Beaton. Aug 65, 25p Rept. no. 0260
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Materials), (*Concrete, Additives), (*Additives, Air), California, Compressive properties, Materials, Bonding, Particle size, Shrinkage, Perform ance (Engineering), Deformation, Effectiveness.

The use of entrained air in concrete has been considered to be one of the greatest advanced in concrete technology in the past 50 years. However, not all of the effects of air-entrainment can be considered beneficial. The results of tests using mixes containing 6 to 8 sacks of cement per cu. yd. warrant the following conclusions: The compressive strength of concrete decreases as air increases. The flexural strength also decreases but to a lesser degree. The requirement of 85% of the compressive strength of non-air-entrained control concrete cannot be met under some of the test conditions of ASTM C 233-58 T. With 1 1/2 in maximum size aggregate and 4% air, the addition of an extra sack of cement per cu. yd. is generally needed to obtain relative strength of 85% of control concrete. Maximum size aggregate is a major factor in strength reduction of air-entrained concrete, 1 1/2 in maximum size shows greater loss than 1 in maximum. Effect of air on compressive strength is dependent on cement factor and aggregate properties. Effect of air on bond of concrete to steel appears to be insignificant. The reproducibility of bond test and bleeding tests are questionable. The drying shrinkage of concrete containing 4 1/2% air is approximately 10% greater than non-air-entrained concrete (Test Method Calif. 530 mod.). Requirements in ASTM C 260 have limited effectiveness in controlling and evaluating the use of air-entraining agents. (Author)

12. MATHEMATICAL SCIENCES

AD-466 778 **Field 12A**
CFSTI Prices: HC$2.60 MF$0.50
Cruft Lab., Harvard Univ., Cambridge, Mass.
STABILITY OF A CLASS OF DIFFERENTIAL EQUATIONS WITH A SINGLE NONLINEARITY.
Technical rept.,
by Kumpati S. Narendra and Charles P. Neuman.
28 Apr 65, 28p TR-468
Contract Nonr-1866 (16),
Proj. NR-372-012

Descriptors: (*Differential equations, Stability), Functions, Nonlinear systems, Feedback, Theorems, Topology.

Identifiers: Lyapunov functions.

The absolute stability of a class of dynamical systems with a single nonlinearity which satisfy neither the Popov nor the extended Popov theorem is investigated in great detail. Specifically, by reexamining the new Lyapunov function introduced recently by the authors and utilizing the Kalman lemma, frequency domain stability criteria are obtained for the linear plant G (s) in the case of both monotone increasing and odd monotone increasing nonlinearities. For infinite sector problems these criteria are applicable to linear plants whose numerator dynamics have some real non-zero zeros; for finite sector problems these criteria are applicable to systems whose characteric equation evaluated at the maximum stable feedback gain has some real non-zero zeros or real non-zero poles. The results presented here demonstrate that the stability criteria on the linear plant are even weaker in the case of odd monotone increasing nonlinearities than in the case of monotone increasing nonlinearities. Some examples are presented in order to illustrate the ideas developed. (Author)

AD-467 034 **Field 12A**
CFSTI Prices: HC$3.60 MF$0.50
Cruft Lab., Harvard Univ., Cambridge, Mass.
STABILITY OF A CLASS OF DIFFERENTIAL EQUATIONS WITH A SINGLE MONOTONE INCREASING NONLINEARITY.
Technical rept.,
by Kumpati S. Narendra and Charles P. Neuman.
28 Apr 65, 34p TR-467
Contract Nonr-1866 (16),
Proj. NR-372-012

Descriptors: (*Differential equations, Stability), Functions, Theorems, Topology.

Identifiers: Lyapunov functions.

The stability of a class of dynamical systems which do not satisfy the Popov theorem is examined. Specifically, by introducing a new Lyapunov function and utilizing frequency domain techniques, sufficient conditions are derived for the stability of the class of systems with a linear plant in the forward path and a monotone increasing nonlinearity in the feedback path. By this assumption of monotone increasing feedback nonlinearities, less restrictive conditions on the linear part of the system, the plant, are obtained. Routh-Hurwitz type conditions are obtained for a class of systems whose linear plnts have real, non-zero, zeros. Some examples are presented in order to illustrate the ideas developed. (Author)

AD-467 488 **Field 12A**
CFSTI Prices: HC$2.60 MF$0.50
Stanford Research Inst., Menlo Park, Calif.
ON THE USE OF TWO-SAMPLE DECISION PROCEDURE FOR DEPENDENT RANDOM VARIABLES AS A TEST OF STRICT-SENSE STATIONARITY.
Technical rept.,
by R. C. McCarty and G. W. Evans, II. Jun 65, 28p TR-28
Contract SD-103, ARPA Order-281-62
Proj. SRI-3857

Descriptors: (*Decision theory, Stochastic processes), (*Statistical tests, *Stochastic processes), Distribution functions.

This is an expository report of some significant results obtained by K. Matusita in the treatment of the classical 'two sample problem' in statistics, when the random variables involved are not necessarily statistically independent. These results should be particularly useful in testing the hypothesis of 'strict-sense' stationarity for a sample of radar data obtained from a single sample function over a finite interval in time (O,T). For example, if the interval (O,T) is divided into n equal subintervals, then data samples from pairs of subintervals may be tested to see if they are from the same distribution. The essence of Matusita's results are presented with some extensions and additional details where required in the interest of clarity, and they are applicd as a distribution-free test of the hypothesis of 'strict-sense' stationarity for a generalized random process. (Author)

AD-470 083 **Field 12A**
CFSTI Prices: HC$6.00 MF$1.25
Systems Research Labs., Inc., Dayton, Ohio.
A SURVEY AND EXTENSION OF TECHNIQUES IN FACTOR ANALYSIS.
Final rept., Feb 64-Feb 65,
by David H. Brand, Larry E. Irwin, Elizabeth B.Ostermann, Thomas G. Donnelly, and James N. Duley. Aug 65, 223p
Contract AF 30 (602)-3300,
Proj. AF-5581,
Task 558110
RADC TR-65-124

Descriptors: (*Factor analysis, Textbooks), Mathematical analysis, Statistical processes, Mathematical models, Correlation techniques, Statistical functions, Matrix algebra, Rotation, Reviews.

The purpose of the work here was to present the structure of factor analysis to a physical scientist and to extend the structure where it was weakest. The reference guide in the appendix performs as a dynamic survey of factor analysis by guiding a neophyte factor analyst through an application. Reference is made to expand presentations in the body of the report. The structure of factor analysis has been extended in the following areas: effects on the number of observations, sampling effect, interpretation of factors and communality. (Author)

PB-168 918 **Field 12A, 6C**
CFSTI Prices: HC$1.00 MF$0.50
Stanford Univ., Calif. Applied Mathematics and Statistics Labs.
MULTIPLICATIVE POPULATION CHAINS,
by J. E. Moyal. 22 Aug 61, 22p Technical rept. TR-6
Grant NSF-G9670

Descriptors: (*Population, Distribution), (*Stochastic processes, Genetics), Distribution theory.

It is shown that the basic results concerning single-state multiplicative chains can be extended to general multiplicative population chains, where the probability distribution of the issue at each generation depends on the state x of the parent. In particular it is shown that given an ancestor in state x, the sequence of extinction probabilities at each generation always converges to an ultimate extinction probability q (x). Furthermore if m (x) is the mean number in the first generation, then q (x) = 1 if sup m (x) <1 and sup q (x) < 1 if inf m (x) > 1, the suprema and infima being taken over all possible states x. (Author)

PB-168 921 **Field 12A, 5B**
CFSTI Prices: HC$1.00 MF$0.50
Michigan State Univ., East Lansing. Dept. of Statistics.
STATISTICAL LAWS OF ACCUMULATION OF INFORMATION,
by Alfred Renyi. 27 Jun 61, 12p RM-82, AR-1
Grant NSF-G9660

Descriptors: (*Mathematical models, Information theory), (*Information theory, Mathematical models), Probability, Set theory.

PB-168 950 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Illinois Univ., Urbana.
ON THE ORDER STRUCTURE OF THE SET OF SUFFICIENT SUBFIELDS,
by D. L. Burkholder. 1962, 9p
Grant NSF-G11382
Prepared in cooperation with California Univ., Berkeley.

Descriptors: (*Probability, Set theory), (*Set theory, Probability), Measure theory, Real numbers, Algebra.

PB-168 951 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Illinois Univ., Urbana.
SEMI-GAUSSIAN SUBSPACES,
by D. L. Burkholder. 1962, 15p
Grant NSF-G11382

Descriptors: (*Statistical processes, Functional analysis), Series, Real numbers, Set theory, Measure theory.

PB-168 965 **Field 12A**
CFSTI Prices: HC$3.00 MF$0.50
Illinois Univ., Urbana.
LIMITING BEHAVIOR OF A SEQUENCE OF DENSITY RATIOS.
Thesis,
by Sunardi Wirjosudirdjo. 1961, 53p
Grant NSF-G11382

Descriptors: (*Sequences, Measure theory), (*Measure theory, Sequences), Probability, Stochastic processes, Statistical tests.

Identifiers: Theses.

PB-169 068 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Cornell Univ., Ithaca, N. Y. Dept. of Mathematics.
ON NONEXPANSIVE MAPPINGS,
by Michael Edelstein. 1963, 10p
Grant NSF-G18837

Descriptors: (*Mapping (Transformations), Theorems), Sequences, Functional analysis.

PB-169 075 **Field 12A**
CFSTI Prices: HC$3.00 MF$0.75
Chicago Univ., Ill.
EXISTENCE AND UNIQUENESS THEOREMS FOR SYSTEMS OF PARTIAL DIFFERENTIAL EQUATIONS,
by A. P. Calderon. 1963, 68p
Grant NSF-G8205

Descriptors: (*Partial differential equations, Theorems), (*Theorems, Partial differential equations).

PB-169 077 **Field 12A**
CFSTI Prices: HC$2.00 MF$0.50
Stanford Univ., Calif. Applied Mathematics and Statistics Labs.
TOLERANCE REGIONS FOR A MULTIVARIATE NORMAL POPULATION,
by Minoru Siotani. 22 Mar 63, 35p Technical rept. TR-5
Grant NSF-G214

Descriptors: (*Multivariate analysis, Population (Mathematics)), (*Population (Mathematics), Multivariate analysis).

PB-169 078 **Field 12A**
CFSTI Prices: HC$3.00 MF$0.75
Illinois Univ., Urbana.
THE KLEIN GROUP AS A FIXED POINT FREE AUTOMORPHISM GROUP.
Doctoral thesis,
by Steven F. Bauman. 1962, 63p
Grant NSF-G9654

Descriptors: (*Groups (Mathematics), Invariance), Theory.

Identifiers: Theses.

PB-169 079 **Field 12A**
CFSTI Prices: HC$5.00 MF$1.00
Columbia Univ., New York. Teachers Coll.
COMPARING MAHALANOBIS DISTANCES,
by Theophilos N. Cacoullos. May 62, 154p
Technical rept. TR-2
Grant NSF-G11450

Descriptors: (*Decision theory, Minimax technique), Multivariate analysis.

PB-169 082 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Cornell Univ., Ithaca, N. Y.
STRONGLY RECURRENT TRANSFORMATIONS,
by Arshag Hajian. 1963, 10p
Grant NSF-G18837

Descriptors: (*Transformations (Mathematics), Measure theory), (*Measure theory, Transformations (Mathematics)), Set theory.

PB-169 083 **Field 12A, 9D**
CFSTI Prices: HC$1.00 MF$0.50
Cornell Univ., Ithaca, N. Y.
ON THE EIGENVALUES OF AN INTEGRAL EQUATION ARISING IN THE THEORY OF BAND-LIMITED SIGNALS,
by W. H. J. Fuchs. 1964, 15p
Contract AF18 (600)-685; Grant NSF-G18837

Descriptors: (*Integral equations, Information theory), (*Information theory, Integral equations), Functional analysis, Complex variables, Signals.

PB-169 088 **Field 12A**
CFSTI Prices: HC$2.00 MF$0.50
Cornell Univ., Ithaca, N. Y.
ASYMPTOTIC BEHAVIOR OF THE EIGENVALUES OF CERTAIN INTEGRAL EQUATIONS,
by Harold Widom. 1964, 32p
Grant NSF-G18837

Descriptors: (*Integral equations, Functional analysis), Integral transforms, Complex variables.

PB-169 099 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Purdue Univ., Lafayette, Ind. Dept. of Statistics.
ON SECOND MOMENTS OF STOPPING RULES,
by Y. S. Chow and H. Teicher. Oct 65, 13p Mimeograph Ser-59
Grant NSF-GP-4590

Descriptors: (*Decision theory, Sequential analysis), Stochastic processes.

Identifiers: Stopping - rule problems.

PB-169 109 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Adelphi Univ., Garden City, N. Y. Dept. of Graduate Mathematics.
NORMS OF POWERS OF MATRICES IN A SPECIAL CLASS,
by Mary Louise Buchanan. Sep 65, 20p AGM-125
Grant NSF-GP-4573

Descriptors: (*Matrix algebra, Theory), Numerical analysis.

PB-169 133 **Field 12A**
CFSTI Prices: HC$2.00 MF$0.50
Wisconsin Univ., Madison. Dept. of Statistics.
DISCRIMINATION AMONG MECHANISTIC MODELS,
by G. E. P. Box and W. J. Hill. Jul 65, 30p Technical rept. TR-51
Grant NSF-GP-2755

Descriptors: (*Mathematical models, Selection), Sequential analysis.

PB-169 135 **Field 12A**
CFSTI Prices: HC$5.00 MF$1.00
Michigan Univ., Ann Arbor. Engineering Research Inst.
ELLIPTIC FUNCTIONS WITH COMPLEX ARGUMENTS.
Final rept.,
by F. M. Henderson. Oct 57, 176p Rept. no. 2666-1-F
Grant NSF-G-3974,
Proj. 2666

Descriptors: (*Functions, Complex variables), (*Complex variables, Functions), Tables, Integrals, Conformal mapping.

Values of the elliptic functions sn w, cn w, dn w, and E (w) are tabulated for complex values of the argument w = u + iv. Results are not only tabulated but are also plotted in the form of charts which illustrate the behavior of these functions in the w

plane. Contours of x and y, the real and imaginary parts of the elliptic function, are drawn on the w plane, giving a representation of the conformal mapping problem to which elliptic functions provide the solution. Advantages claimed for this arrangement are compactness, convenience, and the simple illustration of the general behavior of the functions. (Author)

PB-169 136 **Field 12A**
CFSTI Prices: HC$2.00 MF$0.50
Digital Computer Lab., Univ. of Illinois, Urbana.
ON THE NUMERICAL SOLUTION OF STURM-LIOUVILLE DIFFERENTIAL EQUATIONS,
by C. C. Farrington, R. T. Gregory and A. H. Taub. 1960, 33p
Grant NSF-G1221

Descriptors: (*Differential equations, Numerical analysis), (*Numerical analysis, Differential equations).

PB-169 158 **Field 12A**
CFSTI Prices: HC$3.00 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
CALCUL D'INTEGRALES DE QUELQUES FUNCTIONS DE BESSEL (CALCULATION OF THE INTEGRALS OF SOME BESSEL FUNCTIONS),
by Lucienne Gautier and Christian Bardin. Dec 65, 71p CEA-R-2927
Text in French Attached Summary in English.

Descriptors: (*Bessel functions, Integrals), (*Integrals, Bessel functions), France.

PB-169 162 **Field 12A**
CFSTI Prices: HC$3.00 MF$0.75
Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
DETERMINATION D'UNE BASE DE FONCTIONS PROPRES ET DE LA NORME CORRESPONDANTE DANS LE CAS DE L'EQUATION INTEGRO-DIFFERENTIELLE DE BOLTZMANN A UNE VITESSE ET EN GEOMETRIE SPHERIQUE (DETERMINATION OF A BASIC SET OF EIGEN-FUNCTIONS AND OF THE CORRESPONDING NORM IN THE CASE OF THE ONE-VELOCITY INTEGRAL DIFFERENTIAL BOLTZMANN EQUATION IN SPHERICAL GEOMETRY),
by Pierre Lafore. Dec 65, 64p CEA-R-2926
Text in French; Attached Summary in English.

Descriptors: (*Functional analysis, Differential equations), (*Geometry, Spheres), Integral equations, France.

The object of the present work is to draw up a basic set of orthogonal eigenfunctions; resolution of the one-velocity integral-differential BOLTZMANN equation; this in the case of a spherical geometry system. (Author)

PB-169 379 **Field 12A**
CFSTI Prices: HC$2.60 MF$0.50
System Development Corp., Santa Monica, Calif.
RESOLUTION OF THE HEYWOOD CASE IN THE MINRES SOLUTION.
Professional paper,
by Harry H. Harman and Yoichiro Fukuda. 20 Jan 66, 21p SP-2334

Descriptors: (*Factor analysis, Optimization), Mathematical programming, Programming (Computers).

In the course of developing the minres method of factor analysis, the troublesome situation of communalties greater than one arose. This problem--referred to as the generalized Heywood case--is resolved in this paper by means of a process of minimizing the sum of squares of off-diagonal residuals. The resulting solution is superior to the otherwise very efficient original minres method and without requiring additional computing time. The computer program is written in FORTRAN II for the Philco 2000 and is available at SDC. (Author)

PB-169 395 **Field 12A, 3C**
CFSTI Prices: HC$2.60 MF$0.50
System Development Corp., Santa Monica, Calif.
SMOOTHING OPERATORS, SIEGEL'S THEOREM, AND CELESTIAL MECHANICS,
by Richard B. Barrar. 20 Jan 66, 21p SP-2335/000/00

Descriptors: (*Iterative methods, Functional analysis), (*Celestial mechanics, N-body problem), Theorems, Operators (Mathematics), Hamiltonian.

A new approach to problems involving 'loss of derivative' is presented. To illustrate the approach a new proof of a theorem of C. L. Siegel, and a new proof of results of Arnold and Barrar in celestial mechanics are given. (Author)

13. MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

AD-423 128 **Field 13H, 22B, 13I**
CFSTI Price: HC$4.60
Tapco Div., Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
PRECISION FORGING PROGRAM FOR TURBINE WHEELS AND GEARS.
Interim technical progress rept. no. 5,
by R. W. Redlinger. 13 Oct 63, 45p ER-5591
Contract AF 33 (657)-8791
ASD TR-7-930-5

Descriptors: (*Turbine wheels, Forging), (*Gears, Forging), Extrusions, Turbine blades, Manufacturing methods, Aerospace craft.

The radial extrusion forming process has been developed to produce precision high speed gears and turbine wheels with integral blades. Process variables were established and applied to full scale forging. Evaluation of the secondary closure mechanism demonstrated the feasibility of applying a secondary hydraulic pressure to forging tooling while the main ram of the mechanical press supplies the energy required for forging. Fulfillment of the Phase II objective was attained by actual forging tests conducted with the components developed during this phase.

AD-462 959 **Field 13J, 20D**
CFSTI Price: HC$5.60
Saint Anthony Falls Hydraulic Lab., Univ. of Minnesota, Minneapolis.
FURTHER STUDIES OF VENTILATED CAVITIES ON SUBMERGED BODIES.
Interim rept.,
by F. R. Schiebe and J. M. Wetzel. Oct 64, 57p
Project rept. 72
Contract Nonr-710 (48),
Proj. NR 062-192

Descriptors: (*Hydrofoils, Cavitation), (*Cavitation, Underwater objects), Vortices, Wake, Jets, Surfaces.

This report supplements an earlier report describing experimental studies conducted to determine the air requirements of ventilated cavities on hydrofoils and other submerged bodies in the vicinity of a free surface. Reentrant jet, trailing vortex, and pulsating cavities were observed. In the report, primary attention was given to extending an analysis of the type reported by Cox and Clayden and later extended by Campbell and Hilborne for predicting the air requirements of trailing vortex type cavities and for obtaining pertinent experimental data. It was shown that good agreement with the experimental data was obtained by both theoretical and semiempirical expressions. Secondary attention was given to further verification of a correlation parameter previously derived for reentrant jet type cavities. The transition region between reentrant jet and trailing vortex cavities was also investigated. For some conditions, pulsating cavities were found in the transition region. (Author)

AD-469 600 **Field 13M, 13B, 8M**
CFSTI Prices: HC$14.60 MF$1.00
Michigan Univ., Ann Arbor.
VERTICAL MOTION OF RIGID FOOTINGS.
Final rept. (Doctoral thesis),
by John Lysmer. Jun 65, 149p
Contract DA-22-079-eng-340,
Proj. ORA-05366
AEWES CR-3-115,
N65 35297

Descriptors: (*Foundations (Structures), Vibration), (*Civil engineering, Foundations (Structures)), Engineer ing geology, Soils, Elasticity, Loading (Mechanics), Dynamics, Mathematical models, Soil mechanics.

It is the objective of this work to describe the dynamic behavior of footings and to develop practical methods for dynamic analysis. The investigations are limited to the simple case of a rigid circular footing resting on a plane soil surface and excited by a vertical time-dependent force in the axis of symmetry. In order to arrive at a model which can be analysed mathematically it is assumed that the subsoil can be considered as a perfectly elastic, isotropic and homogeneous half-space and that only normal stresses are transferred at the interface between footing and soil.

Patent 3,229,433 **Field 13M, 13J**
STRUCTURAL SANDWICH PANEL DECK.
Patent assigned to Navy,
by William H. Miles. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Flight deck, Sandwich panels), (*Sandwich panels, Ship decks), Plywood, Floors, Patents, Laminates, Metal plates, Sheets.

The metal-faced plywood panelling may be used as a durable, impact resistant floor or deck surface, for example, as the flight deck surface of an aircraft carrier. The laminate is an adhesively bonded structure formed of separate wood and metal courses with no need for through joints or other mechanical fastenings.

Patent 3,229,458 **Field 13J**
PULSE-TYPE PROPULSION SYSTEM FOR WATER CRAFT.
Patent assigned to Navy,
by Thomas G. Lang. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Underwater propulsion, Gases), Patents, Thrust, Bubbles, Pressure.

The propulsion system is for torpedoes, submerged propulsion pods, hydrofoils and submarines. The submerged body is propelled by intermittent discharges of high pressure gas which, due to their expansion in the water, produce direct thrust on the outer surface of the body.

Patent 3,229,462 **Field 13J, 19H**
PROPULSION SYSTEM.
Patent assigned to Navy,
by Nicholas Fatica. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Underwater propulsion, Torpedoes), Patents, Steam turbines, Gas generating systems, Hydrogen, Oxidizers.

The closed cycle propulsion system for a torpedo uses aluminum as a source of hydrogen. The system includes a fuel generator, a store of oxidizer, a combustion chamber, a steam-driven prime mover, a condenser and three displacement pumps driven by a common drive shaft. Two of the pumps deliver and meter water to the fuel generator, and the store of oxidizer. The third pump delivers and meters diluent water to the combustion chamber.

Patent 3,229,736 **Field 13I**
SAW BLADE FOR CUTTING LOGS.
Patent assigned to Agriculture,
by Hiram Y. Hallock. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Saw blades, Wood), Patents, Effective ness, Economics, Cutting tools.

The circular blade structure is tapered in a novel manner which combines the advantages of extra saw stiffness resulting from more steel in the saw body and a narrow kerf resulting from a thinner rim and narrow teeth. The saw structure indicates an annual, national, potential reduction of from 3 to 4 million tons of sawdust or a production increase of 1 1/2 billion board feet of lumber per year.

Patent 3,229,759 **Field 13A, 20M**
EVAPORATION-CONDENSATION HEAT TRANSFER DEVICE.
Patent assigned to AEC,
by George M. Grover. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Heat exchangers, Capillary tubes), Lithium, Niobium alloys, Zirconium alloys, Containers, Thermal conductivity, Vapors, Condensation, Patents.

The heat transfer device includes a container having condenser and evaporator regions composed of niobium-1 percent zirconium alloy. The container encloses a condensable vapor consisting of lithium. Capillary structure covers the entire inner surface of the container except for a portion of the condensing region. The vapor is present in an amount to saturate the capillary structure which transports the condensed vapor from the cooler to the hotter area of the container.

Patent 3,229,884 **Field 13I, 13H, 19G**
SEGMENTED BACK-UP BAR.
Patent assigned to NASA,
by William J. Franklin and Neil C. Martin. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Jigs, Welding), (*Welding, Rocket cases), Patents, Tanks (Containers),Inflatable struc tures, Supports.

The back-up bar is for use internally at abutting ends of tank sections while the sections are being welded together. It is easily removed after the welding operation. The bar is used in assembling tank sections of large rocket boosters. The bar is composed of similar short arcuate segments. Each segment has a rigid channel member which receives an elastomeric ribbon member which has a plurality of contact surface plates dovetailed therein. Beneath the elastomeric material is an inflatable bladder which is adapted to inflate and push the elastomeric ribbon member so its contact surface plates are pressed against the tubular body sections at opposite side of the seam.

Patent 3,229,996 **Field 13K**
DISCONNECTABLE TUBE COUPLING.
Patent assigned to AEC,
by Jerry J. Cadwell. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Couplings, Disconnect fittings), Patents, Pipe fittings.

The quickly disconnectible coupling is for use on chemical-process lines. Itis readily adjustable to exert a wide range of gasket pressures. The coupling structure includes a male member, a gasket ring, a set of balls, a seond male member, a female member and a retainer for the balls to make them connect the first male member and the female member to each other.

Patent 3,230,030 **Field 13H, 11E**
PROCESS OF PRODUCING WRINKLE RESISTANT CELLULOSE FABRICS OF RELATIVELY HIGH MOISTURE REGAIN.
Patent assigned to Agriculture,
by Clifford M. Moran, Sidney L. Vail andRussell M. H. Kullman. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Textiles, Finishes ; finishing), Patents, Impregnation, Cotton textiles, Isocyanate plastics, Aging (Materials), Deformation, Processing, Moisture.

Cellulose fabrics are made wrinkle resistant by impregnating them with an aqueous solution containing 1 to 5 weight percent of dihydroxyethylene bisurethane and from 0.5 to 5 percent of an acidic catalyst. The impregnated fabric is then dry cured with heat.

PB-169 299 **Field 13B, 20D**
CFSTI Prices: HC$2.00 MF$0.50
Bureau of Reclamation, Denver, Colo. Hydraulics Branch.
AERODYNAMIC STUDY OF CONCRETE SURFACE ROUGHNESS FOR CANAL CAPACITY PROGRAM.
Progress rept.,
by J. M. Bergmann and R. A. Dodge. 15 Dec 65, 34p Hyd-521

Descriptors: (*Concrete, Hydraulic models), (*Hydraulic models, Concrete), (*Inland waterways, Concrete), Surface properties, Friction, Fluid flow, Test methods, Aerodynamics, Fluid mechanics.

Laboratory tests evaluating the ability of velocity distribution and shear tube methods to determine Nikuradse's equivalent sand roughness as a measure of the fluid dynamic roughness of a concrete canal lining were not conclusive. A closed-conduit test duct with top and sides of transparent plastic and bottom (test surface) of wood float finished concrete used air as the fluid. Random mechanical measurements of test surface texture were made for statistical comparison of surface roughness at three measuring stations. The velocity distribution method is a direct application of the PrandtlvonKarman equation to measured vertical velocity profiles. The shear tube method is Preston's method for boundary shear determination applied to fluid pressures near test surface. Both methods indicated an increase in equivalent sand roughness as the standard deviation of mechanical measurements increased. Equivalent sand roughness values determined by velocity distribution method averaged 2.5 times greater than those determined by the shear tube method. Reason for such a discrepancy is not known, but further improvements in instrumentation and measuring techniques and more data will be needed to evaluate the two methods and to derive possible correlations between statistical parameters representing physical roughness and those representing fluid dynamic roughness. (Author)

PB-169 301 **Field 13D, 11L**
CFSTI Prices: HC$2.00 MF$0.50
Forest Products Lab., Madison, Wis.
FOREST PRODUCTS LABORATORY LIST OF PUBLICATIONS ON BOX AND CRATE CONSTRUCTION AND PACKAGING DATA.
Jan 66, 31p
List previously issued as Rept. no. 791.

Descriptors: (*Containers, Bibliographies), (*Packaging, Bibliographies), Wood, Fiberboard, Tests, Fastenings, Reinforcing materials, Specifications.

A bibliography is given of FPL publications on the following topics: nailed-wood boxes, nailed-wood crates, wirebound containers, wood-cleated boxes, corrugated and solid fiberboard boxes, testing of containers and packaging materials, pallets, barrels, general packaging data, strapping and metal reinforcing, fasteners, wood--its properties, etc, miscellaneous container data, data on specific commodity containers.

PB-169 487 **Field 13B, 2C**
CFSTI Prices: HC$5.00 MF$1.00
Illinois Univ., Urbana. Engineering Experiment Station.
HIGHWAY AND AGRICULTURAL DRAINAGE PRACTICES,
by Carroll J. W. Drablos and Benjamin A. Jones, Jr. 1965, 173p Bull-480

Descriptors: (*Drainage, Civil engineering), (*Roads, Drainage), (*Agriculture, Drainage), Law, Illinois, Erosion, Sanitary engineering.

The principles and practices of the division of highways in the treatment of interrelated highway and agricultural drainage and erosion control have been developed over a period of many years. Much of this information, however, is not available in a single source. The purpose of this study was therefore to assemble and analyze data relating to the practices and procedures followed by highway authorities in controlling highway and agricultural drainage waters. Information contained in this report was collected from highway authorities, governmental agencies, consultants, and private individuals located both in Illinois and in other states. Emphasis was placed on drainage practices and procedures rather than on design details. The resume of the practices followed by highway authorities and others together with the compilation of the drainage laws can provide highway and agricultural administrators with an important tool to assist in the establishment of sound drainage policies. (Author)

PB-169 498 **Field 13B, 5C**
CFSTI Prices: HC$2.00 MF$0.50
Virginia Council of Highway Investigation and Research, Charlottesville.
A SURVEY OF VIRGINIA RETAIL GASOLINE SALES. CONSUMER AWARENESS OF MOTOR FUEL TAX RATES AND PRICES,
by Kenneth E. Cook and Patrick A. Rush. Apr 65, 49p Rept. no. 0091
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Gasoline, Economics), (*Virginia, Economics),. (*Economics, Virginia), Passenger vehicles, Roads, Costs, Commerce, Distribution (Economics), Consumption, Law, Civil engineering.

Identifiers: Taxes, State revenue, Highway research.

This study provides information about the gasoline buying habits of both Virginia and out-of-state drivers and the awareness of both groups as to the amount of not only the total Federal and State gasoline taxes collectively but also of the amount of tax levied by each governmental unit. The study also investigates the public's awareness of the price of gasoline, the hours of day gasoline is purchased as well as many other variables regarding drivers, vehicles, service stations and methods of purchasing gasoline. (Author)

PB-169 500 **Field 13B, 5C**
CFSTI Prices: HC$2.00 MF$0.50
Washington Univ., Seattle. Transportation Research Group.

AN EVALUATION OF USER BENEFITS OF FREEWAYS BYPASSING OLYMPIA,
by Roy B. Sawhill and Keith C. Crandall. Jul 64, 44p Research rept. no. 12
Contract Y-589
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Washington), (*Economics, Washinton), (*Washington, Roads), Traffic, Costs, Fuel consumption, Time, Commerce, Transportation.

Identifiers: Freeways.

The road user benefits in travel time and fuel consumption resulting from using the Olympia, Washington, freeway by-pass as compared to travel over the alternate business routes are computed. The freeway sections were opened in December 1958. The after study was made in 1963. All three of the by-passes saved the motorist money ranging from 12 to 32 cents per one-way trip. One freeway route required more fuel than its business counterpart, mainly because the freeway was 13% longer in distance but also because the freeway speeds result in higher fuel consumption rates. However, the increased speed of freeway operation resulted in sufficient time savings to obtain a net savings. It is estimated that the three by-passes generate an annual fuel and time savings to the highway users of $783,000. (Author)

PB-169 564 **Field 13F**
CFSTI Prices: HC$5.00 MF$1.00
Operations Research, Inc., Silver Spring, Md.
STUDY OF TRAFFIC CONTROL SYSTEMS. FEATURES OF TRAIN CONTROL SPECIFICATIONS. REQUIREMENTS FOR TRANSIT CAR SPECIFICATIONS.
NCTA Technical rept. for 15 Jun 64,
by R. M. Karow, E. W. Marlowe, and John K. Sheehan. Apr 64, 174p Rept. nos. 211, 212
Contract NTA-36,
Task 1.3, 2.2

Descriptors: (*Traffic, Control systems), (*Railroads, Control systems), (*Railroad cars, Design), Specifications, Safety, Reliability, Automatic, Monitors, Propulsion, Display systems, Electrical equipment, Signals, Engines ; motors, Brakes, Voice communication systems, Public address systems, Data transmission systems, Switching circuits, Control panels, Doors, Heating, Air conditioning equipment, Ventilation, Couplings, Cargo vehicles, Noise, Vibration, Construction, Materials, Tests.

Identifiers: Rapid transit systems.

The report examines the part that control plays in the operation of a rapid transit railway, and a particular operating concept is recommended. The overall requirement calls for a finer degree of control than exists in present systems along with improved devices and equipment. The recommended system employs mostly existing concepts but does require development of some advanced equipment designs. Specifications describing the functional requirements of a train control system are given. These specifications, together with appropriate contractual requirements and engineering plans and data, can be used as a basis for preparing the detailed specifications for procurement of the control system for the proposed National Capital Rapid Transit System. Requirements that are recommended for inclusion in the preparation of specifications for prototype and production-model transit cars are set forth. Continuing effort should be exercised by the National Capital Transportation Agency to observe and keep pace with the advances being made in the field of transit car component development, e.g., trucks, motors, motor controls, body framing and materials, springing, air conditioning, heating, etc., so that when the time arrived for the specifications to be prepared, the latest advances may be incorporated.

PB-169 586 **Field 13M**
CFSTI Prices: HC$2.60 MF$0.50
Brown and Root, Inc., Houston, Tex.
NUMERICAL ANALYSIS OF A BEAM UNDER TENSION,
by H. L. Butler, C. Delfosse, A. Galef, and B. J. Thorn. 1965, 22p
Rept. on Proj. MOHOLE. Subcontracted to National Engineering Science Co., Houston, Tex. Supported in part by NSF.

Descriptors: (*Beams (Structural), Stresses), Drilling machines, Pipes, Structural properties, Numerical analysis, Well logging, Feasibility studies.

Identifiers: Mohole project, Risers.

A finite difference formulation for determining the static deflection and stress configuration of a long beam under tension is presented. The formulation was developed in the course of studies of the 'Mohole' riser, which has a variable tension, section modulus, and horizontal loading and is so long (up to 18,000 ft) that direct solutions could not be found. (Author)

PB-169 589 **Field 13H, 14B**
CFSTI Prices: HC$7.00 MF$1.50
Brown and Root, Inc., Houston, Tex.
TECHNIQUE AND EQUIPMENT DEMONSTRATIONS OF TUBULAR GOODS INSPECTION.
Final rept.
16 Oct 65, 307p
Rept. on Proj. MOHOLE. Subcontracted to AMF Tuboscope, Inc., Houston, Tex. Supported in part by NSF.

Descriptors: (*Non-destructive testing, Drills), (*Drills, Non-destructive testing), (*Pipes, Non-destructive testing), Quality control, Metals, Defects (Materials), Measuring devices (Electrical + electronic), Acoustic equipment, Ultrasonic radiation, Well logging, Feasibility studies.

Identifiers: Mohole project, Risers.

Techniques applicable to the nondestructive inspection of tubular goods to be used during the drilling phase of Project MOHOLE are described. Primarily, modified basic techniques of improved sensitivity were demonstrated, although in certain instances, new methods were devised. Actual hardware was assembled to demonstrate most of the techniques under conditions similar to those known to exist in drilling operations. The report covers four main areas of interest: (1) Platform Drill Pipe Inspection, (2) platform riser casing inspection, (3) platform thread inspection, and (4) receiving inspection. These in turn are divided into subsections, each describing a means of detecting specific flaws and variations in pipe parameters. (Author)

PB-169 643 **Field 13J, 14D, 14A**
CFSTI Prices: HC$3.00 MF$0.50
Dunlap and Associates, Inc., Santa Monica, Calif. Western Div.
MARITIME ADMINISTRATION MAINTENANCE AND RELIABILITY PROGRAM. VOLUME I. SUMMARY AND RECOMMENDATIONS,
by Donald T. Hanifan and Ronald A. Westland. Mar 65, 53p
Contract MA-3402

Descriptors: (*Merchant vessels, Maintainability), (*Maintenance, Merchant vessels), (*Reliability, Merchant vessels), Data processing systems, Costs, Optimization, Operations research, Mathematical models, Economics, Marine engineering, Classification, Data, Analysis, Operation, Collecting methods, Design, Logistics.

Research performed toward developing a Maritime Administration Maintenance and Reliability Program for merchant ships is described in a series of four volumes. Briefly, the nature of the problem is described as one of economics (excessive merchant ship total construction and operational costs) and a previous lack of information and techniques adequate for achieving significant improvements. The approach selected involves the use of operations research and systems analysis techniques together with maintainability and reliability technology to provide a basis for reducing operating costs. The report primarily emphasizes maintenance and reliability aspects and underscores the urgent need for well-developed planned maintenance systems; systematic, fleetwide maintenance and reliability data collection and analysis; and an integrated data management system. Volume I discusses the problem and the general approach, presents general and specific recommendations, and summarizes the general results as well as selected specific results. Included is a preliminary characterization of shipboard maintenance frequency and manhours at sea as well as ship-system maintenance shore costs and a limited comparison with Navy experience.

PB-169 644 **Field 13J, 14D, 14A**
CFSTI Prices: HC$6.00 MF$1.25
Dunlap and Associates, Inc., Santa Monica, Calif. Western Div.
MARITIME ADMINISTRATION MAINTENANCE AND RELIABILITY PROGRAM. VOLUME II. ENGINEERING REPORT,
by Donald T. Hanifan, Ronald A. Westland, and Lawrence B. Sklar. 30 Nov 65, 222p
Contract MA-3402

Descriptors: (*Merchant vessels, Maintainability), (*Maintenance, Merchant vessels), (*Reliability, Merchant vessels), Data, Analysis, Collecting methods, Operation, Data processing systems, Costs, Optimization, Operations research, Mathematical models, Economics, Marine engineering, Classification, Design, Logistics.

Volume II discusses data collection and analysis, including the results of one program using U. S. Merchant Marine Academy Cadets as observers and another using Chief Engineers. Mathematical modelling approaches are also described, including total cost models, maintenance and inspection policy models, maintainability and reliability design models, and ship availability models. A vast amount of data was accumulated during the course of the program which could not be included due to space limitations. Much of the data was so incomplete that its inclusion even in summary form was not warranted. However, given acquisition of further data as recommended in this report, the value of the data bank so far accumulated should increase substantially. In general, the need for and feasibility of an on-going Merchant Ship Maintenance and Reliability Program have been further reinforced by the results to date. A workable approach (given reasonable shipping-line cooperation) has been identified; a number of its elements have been tested; and a basis for its implementation has been created.

PB-169 645 **Field 13J, 14D, 5B, 9B**
CFSTI Prices: HC$4.00 MF$0.75
Dunlap and Associates, Inc., Santa Monica, Calif. Western Div.
MARITIME ADMINISTRATION MAINTENANCE AND RELIABILITY PROGRAM. VOLUME III. CLASSIFICATION OF MERCHANT SHIP SYSTEMS,
by Donald A. Atkins and Donald T. Hanifan. 30 Nov 65, 115p
Contract MA-3402

Descriptors: (*Merchant vessels, Maintainability), (*Maintenance, Merchant vessels), (*Reliability, Merchant vessels), (*Classification, Marine engineering), Data, Analysis, Collecting methods, Operation, Data processing systems, Costs, Operations research, Mathematical models, Programming (Computers), Logistics, Ship structural components, Ship auxiliary equipment.

Volume III presents a hierarchical classification of merchant ship systems. Use of the classification facilitates data organization and manipulation, and provides a foundation for reliability-maintenance models.

PB-169 646 **Field 13J, 14D, 14A, 5A**
CFSTI Prices: HC$3.00 MF$0.50
Dunlap and Associates, Inc., Santa Monica, Calif. Western Div.
MARITIME ADMINISTRATION MAINTENANCE AND RELIABILITY PROGRAM. VOLUME IV. ANALYSIS OF MAINTENANCE COST DATA,
by Ronald A. Westland, Donald A. Atkins, Lawrence B. Sklar, and Donald T. Hanifan. 30 Nov 65, 58p
Contract MA-3402

Descriptors: (*Merchant vessels, Maintainability), (*Maintenance, Merchant vessels), (*Reliability, Merchant vessels), (*Costs, Marine engineering), Cost effectiveness, Ship structural components, Ship auxiliary equipment, Boilers, Data, Analysis, Opera tion, Statistical analysis, Logistics, Management engineering, Classification, Operations research.

Volume IV presents the results of an analysis of 532 ship-months of Maintenance (Upkeep) and Repair Cumulative Summary Report (MA-140) cost data. The analysis includes an evaluation of overall ship, boiler and winch maintenance- and repair-costs. Preliminary results are presented which identify effects of age and statistical differences between different ship-types, operators, manufacturers and trade-routes.

PB-169 677 **Field 13B, 14B**
CFSTI Prices: HC$3.00 MF$0.50
Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.
SELECTED METHODS FOR THE MEASUREMENT OF AIR POLLUTANTS.
May 65, 55p
PHS Pub-999-AP-11

Descriptors: (*Air pollution, Monitors), (*Gas analysis, Air pollution), (*Public health, Air pollution), Waste gases, Atmosphere, Chemical analysis, State-of-the-art reviews, Sanitary engineering.

This manual is an effort to assist in the development of uniform standard methods of analysis of air pollutants. It makes available the judgment and knowledge of a large group of chemists in the Public Health Service. Methods of determining pollutants of common interest are presented in uniform format by chemists on the staff of the Division of Air Pollution. The methods were critically reviewed by the Interbranch Chemical Advisory Committee, which is composed of representatives of the professional chemical groups in all branches of the Division. Methods presented are as follows: For determination of sulfur dioxide, the West and Gaeke and the hydrogen peroxide methods; for determination of nitrogen dioxide and nitric oxide, the Saltzman method; for determination of oxidants, the neutral buffered-potassium iodide and the alkaline potassium iodide methods; for determination of aliphatic aldehydes, the 3-methyl-2 benzothiazolone hydrazone hydrochloride method; for determination of acrolein, the 4-hexylresorcinol method; for determination of formaldehyde, the chromotropic acid method; for determination of sulfate in atmospheric suspended particulates, the turbidimetric barium sulfate method; and for determination of nitrate in atmospheric suspended particulates, the 2, 4 xylenol method. (Author)

PB-169 678 **Field 13B**
CFSTI Prices: HC$3.00 MF$0.50
Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.
WASTE STABILIZATION POND STUDY, LEBANON, OHIO,
by William B. Horning, Ralph Porges, Harold F. Clarke, and Wm. Bridge Cooke. May 64, 53p
PHS Pub-999-WP-16

Descriptors: (*Water pollution, Wastes (Sanitary engineering)), (*Wastes (Sanitary engineering), Stabiliza tion), Bacteria, Purification, Chlorination, Water sup plies, Climatology, Periodic variations, Sampling, Nitrogen compounds, Ammonia, Nitrites, Nitrates, Phosphorus, Oxygen, Solids, Odors, Temperature, Solar radiation, pH, Fungi, Ohio.

Identifiers: Ponds.

The paper presents a study of the Lebanon, Ohio, waste stabilization ponds during each of the four seasons of the year. The objectives of the study were to evaluate waste stabilization pond performance, to determine the fate of pathogenic bacteria in terms of total and fecal coliform and fecal streptococci organisms, and to obtain supporting physical, chemical, and biochemical data. From this study it can be concluded that waste stabilization ponds in this area can effectively treat domestic wastes with a 5-day BOD loading rate of approximately 100 pounds per acre per day, that effective bacterial reductions can be achieved, and that waste stabilization pond effluents can be effectively chlorinated. (Author)

PB-169 680 **Field 13B**
CFSTI Prices: HC$3.00 MF$0.75
Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.
INFLUENCE OF IMPOUNDMENTS ON WATER QUALITY. A REVIEW OF LITERATURE AND STATEMENT OF RESEARCH NEEDS, OCTOBER 1964.
Revised ed.,
by James M. Symons, Samuel R. Weibel, and Gordon G. Robeck. Jan 66, 84p
PHS Pub-999-WP-18
Revision of document dated Oct 64.

Descriptors: (*Water pollution, Dams), (*Water supplies, Quality control), Sanitary engineering, Fluid flow, Storage, Operations research, Sampling, Monitors, Oxygen, Carbonates, Inorganic compounds, Organic compounds, Physical properties, Environment, Mathematical analysis, Cost effectiveness.

Identifiers: Eutrophication.

Since streamflow regulation is currently being considered as a method of water quality control and impoundments will be the source of water for regulated streamflow, the changes in water quality that occur during storage in a given environment must be understood and predictable. Much has been written in the sanitary engineering and limnology literature that bears on the broad problem of determining the influence of impoundments on water quality. This report is a review of that literature. It is impossible to report on all of the literature, but sufficient selected references are reviewed to accomplish three purposes: (1) to indicate to readers who are new to the field of impoundment behavior the enormous breadth of the field, (2) to discuss each topic in sufficient detail to give the reader insight into the current understanding of that topic, and (3) to indicate the major research needs in each area and to suggest possible fruitful avenues of study to satisfy these needs. In addition to the major section on impoundment behavior, this report contains sections on the influence of impoundment releases on downstream water quality and operations research for water quality management. (Author)

PB-169 810 **Field 13B, 12A, 18H**
CFSTI Prices: HC$1.00 MF$0.50
Weather Bureau, Washington, D. C.
A TECHNIQUE FOR ESTIMATING AVERAGE AIRBORNE CONTAMINANT CONCENTRATIONS.
Air resources laboratory rept. (Technical),
by Jerome L. Heffter. Feb 66, 14p WBTN-35-ARL-2

Descriptors: (*Air pollution, Density), (*Mathematical prediction, Air pollution), Airborne, Atmospheric sounding, Diffusion, Radioactive fallout, Radioactive isotores, Wind, Test methods, Time, Mathematical analysis, Graphics, Atmospheric motion, Sampling.

A technique is presented for estimating average concentrations of airborne debris (as measured by surface or aircraft samplers) from an instantaneous point source for debris travel times of several hours to several days. Some maximum concentration values computed by this technique are shown to compare favorably with values observed following a number of nuclear detonations. However, it is emphasized that estimated values could be higher or lower than observed values by a factor of 10 or more as a result of the assumptions that are made in the estimation technique and the problems associated with atmospheric sampling. (Author)

PB-169 816 **Field 13B, 13F**
CFSTI Prices: HC$4.00 MF$0.75
Maryland State Roads Commission, Brooklandville, Bureau of Research.
EFFECTS OF CARBIDE STUDDED TIRES ON ROADWAY SURFACES.
Research rept.,
by Allan Lee, Thomas A. Page, and Rafael de Carrera. Jul 65, 126p Rept. no. 0261
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Tires, Performance (Engineering)), (*Roads, Damage), Surfaces, Degradation, Civil engineering, Tungsten compounds, Carbides, Skidding, Wear resistance, Concrete, Asphalt, Pavements, Experimental data, Maryland.

A study to determine the degree that pavement surfaces are abraded or scored by the passage of vehicles equipped with such tires. Two test loops were chosen for the study. Each loop included both rigid and flexible pavement. The trucks traveled about 40 mph during the test and the speed of the passenger cars was in the 50-55 mph range. Two test vehicles with both front and rear wheels equipped with studded tires traversed each loop. All test vehicles made 10,000 circuits. Six sites were selected along each test loop for wear measurements, three for rigid and three for flexible pavement. Five transverse lines of reference plugs on 3-foot centers were established at each site. Four reference points were installed in the pavement on each transverse line, two for inner and two for outer wheel-path wear measurements. A steel straight edge placed on the reference points served as a datum for the wear measurements. For the purpose of determining the best measurement method, wear readings were taken with a depth gage, a venier caliper and a thickness gage. One set of measurements were taken before the start of the test and every two thousand circuits thereafter. The surface texture of the pavement at each test site was recorded periodically with a Texas texturemeter and was also obtained before and after test by means of plaster casts. Significant wear occurred at both test loops. The range in maximum wear for the truck test loop was 0.050-0.174 inch and 0.022-0.170 inch for flexible and rigid pavements, respectively. (Author)

PB-169 817 **Field 13B**
CFSTI Prices: HC$2.00 MF$0.50
Texas Highway Dept., Austin.
EVALUATION OF SINGLE AXLE LOAD RESPONSE ON AN EXPERIMENTAL CONTINUOUSLY REINFORCED CONCRETE PAVEMENT.
Technical rept.,
by B. F. McCullough. Apr 65, 39p RR-46-3, 0272
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. See also PB-169 818.

Descriptors: (*Pavements, Reinforced concrete), (*Reinforced concrete, Loading (Mechanics)), Texas, Performance (Engineering), Roads, Civil engineering, Reinforcing materials, Fracture (Mechanics), Elasticity, Deflection, Foundations (Structures).

The report describes an evaluation of continuously reinforced concrete pavements which is based on the response of these pavements to a single axle load. Pavement response due to axle load is expressed in terms of deflection, deflection basin and radius of curvature. One project, 2,600 feet long, consisted of 6-inch thick pavement placed on a 6-inch thick cement stabilized oyster shell subbase. The concrete contained conventional aggregate in 1,700 feet and lightweight aggregate in the remaining 900 feet. The conventional aggregate pavement had preformed cracks at 5- and 8-foot intervals and longitudinal steel in the amounts of 0.3, 0.4 and 0.5 percent. The lightweight aggregate pavement had preformed cracks at 8- and 20-foot intervals and 0.3 and 0.4 percent longitudinal steel. Single axle loads of 18,000 and 24,000 pounds were used in the evaluation, with the response measurements being taken approximately every 25 feet at the crack and midspan of the slabs. The second continuously reinforced concrete pavement project, 11.3 miles long, consisted of 8-inch thick pavement placed on a 6-inch thick crushed sandstone subbase. About one-half of the project was reinforced longitudinally with 0.5 percent steel and the other half with 0.6 percent steel. A single axle load of 18,000 pounds was used in the evaluation, with response measurements being taken at approximately 200-foot intervals. (Author)

PB-169 818 **Field 13B, 14B**
CFSTI Prices: HC$2.00 MF$0.50
Texas Highway Dept., Austin.
DEVELOPMENT OF A SKID TEST TRAILER.
Technical rept.,
by B. F. McCullough and K. D. Hankins. Apr 65, 40p RR-45-1, 0228
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Test equipment, Skidding), (*Trailers, Test equipment), Texas, Roads, Pavements, Performance (Engineering), Civil engineering, Measurement, Tires.

A two-wheel trailer was selected which obtains a locked wheel skid resistance with the pavement in a wet condition. The system was designed so that either a standard test could be run automatically or the operator could control the various operations (time of skid, amount of water, number of wheels, etc.) through manual control. The development of the various measuring systems and component parts are discussed in detail to provide accessible information for others desiring to construct a skid trailer. In addition the static and dynamic calibration of the trailer and its component systems are discussed. Approximately 12,000 individual tire skids have been performed with the trailer through February, 1965, with good performance and only minor repairs. Tests were made in each highway district in the State encompassing some 500 different projects. (Author)

PB-169 819 **Field 13B, 14B**
CFSTI Prices: HC$3.00 MF$0.75
Texas Highway Dept., Austin.
DEVELOPMENT OF EQUIPMENT AND TECHNIQUES FOR A STATEWIDE RIGID PAVEMENT DEFLECTION STUDY.
Technical rept.,
by B. F. McCullough. Jan 65, 70p RR-46-1, 0197
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. See also PB-169 817.

Descriptors: (*Pavements, Reinforced concrete), (*Reinforced concrete, Deflection), Roads, Test equipment, Test methods, Texas, Temperature, Loading (Mechanics), Vehicles, Performance (Engineering), Civil engineering.

The report presents the development of several new pieces of equipment and a refinement of test procedures. This work entailed: a method of obtaining the slab temperature differential between the top and bottom of the concrete pavement slab, the pavement's radius of curvature as it deflects under a given wheel load, a loaded truck that was capable of moving about the State with a minimum of difficulty, and development of testing techniques.

PB-169 820 **Field 13B, 14B**
CFSTI Prices: HC$2.00 MF$0.50
Kentucky Dept. of Highways, Lexington. Div. of Research.
ACCELEROMETER METHOD OF RIDING QUALITY TESTING.
Interim research rept.,
by Rolands L. Rizenbergs. 30 Apr 65, 48p Rept. no. 0153
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Roughness), (*Accelerometers, Test methods), Civil engineering, Kentucky, Measurement, Surface properties, Test equipment, Pavements, Performance (Engineering).

The report describes the development of a method of measuring road roughness by means of a sensing mechanism consisting of three accelerometers. These accelerometers are mounted on an aluminum plate which rests on the chest of a test passenger of medium build and frame and weighing between 150 and 175 pounds. While the vehicle is in travel, automatic recordings are made simultaneously of vertical, transverse and longitudinal accelerations of the torso of the test passenger. These recordings are summated or integrated with respect to time. The magnitude of the roughness index resulting from this method depends not only on the road profile, but also on the dynamic characteristics of the vehicle and the speed at which the traverse is made. Extraneous variables, such as vehicle springs, shock absorbers and seat, tires, vehicle load and speed, must be controlled in making comparisons between different pavement surfaces. The report provides information on how closely these variables must be controlled. The accelerometer method of measuring road roughness facilitates evaluation of road roughness in terms which are closely associated with riding comfort. The test excursion may be made at a speed that is compatible with the normal flow of traffic and, therefore, can be carried out with maximum safety to testing personnel. The test results are available immediately and are closely repeatable. (Author)

PB-169 821 **Field 13L, 9B**
CFSTI Prices: HC$3.00 MF$0.75
California State Div. of Highways, Sacramento. Traffic Dept.
SURVEILLANCE OF ACCIDENT LOCATIONS BY ELECTRONIC DATA PROCESSING METHODS,
by Richard N. Smith. Nov 65, 68p Rept. no. 0372
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Motor vehicle accidents, Data processing systems), (*Data processing systems, Motor vehicle accidents), Data, Feasibility studies, Programming (Computers), Safety, California.

In determining locations in a highway system where concentrations of accidents are accumulating, the use of the electronic computer can greatly simplify the search process. Machine tabulations are produced from highway system descriptive data and accident data. One tabulation is a monthly accident summary of all accidents listed in route order and lists cumulative numbers of accidents and 0.1 mile accident concentrations where three or more accidents have occurred. There is also a quarterly accident concentration testing which is arrayed in route order, in order of decreasing number of accidents, and in order of decreasing accidents, and in order of decreasing accident rates. A third tabulation includes the details of each accident between specified limits. Example accident and roadway descriptor codes are given to illustrate the monitoring procedure. (Author)

PB-169 822 **Field 13B, 14B**
CFSTI Prices: HC$1.00 MF$0.50
Oklahoma State Dept. of Highways. Research and Development Div.
PRE-FIELD REPORT ON THE CHLOE PROFILOMETER AND ASSOCIATED EQUIPMENT,
Jan 65, 14p Rept. no. 0144
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Meters, Surface properties), (*Roads, Test equipment), Trailers, Performance (Engineering), Civil engineering, Pavements, Roughness, Measurement, Oklahoma.

Identifiers: Profilometers.

This report describes the steps taken to make the CHLOE profilometer field operational. This consisted of a shake-down of the equipment, the construction of a transport trailer and the selection of a towing vehicle. The shake-down indicated several malfunctions and fabrication flaws including faulty wiring, loose plug on the back of the computer, misalinement of roller contact on switch plate, misalinement of the slotted disk in the photocell housing, uninsulated wires in photo-cell housing, diodes touching circuit boards, scratched printed circuits and excess solder that could cause shorting. The transport trailer, a two-wheel dolly, was constructed of standard items readily available in Oklahoma City. In transport, the front section of the CHLOE profilometer is stacked on top of the rear section. An automobile with an automatic transmission was selected as the towing vehicle. The vehicle was specially wired so that its generator system could be used to charge the profilometer batteries and to provide power for the profilometer computer. The entire rear seat was removed and a custom-built desk was installed to accommodate the computer and an electric calculator. (Author)

PB-169 823 **Field 13B**
CFSTI Prices: HC$2.00 MF$0.50
New York State Dept. of Public Works.
AN INVESTIGATION OF ASPHALT CEMENT SUBSEALING AND LIME-CEMENT JACKING.
May 65, 45p Rept. no. RR-65-2
Proj. 25
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Pavements, Maintenance), (*Maintenance, Pavements), (*Cements, Maintenance), Fracture (Mechanics), Seals (Stoppers), Civil engineering, Roads, Concrete, Asphalt, Calcium compounds, Hydroxides, New York.

This report describes an evaluation of two methods currently used in New York to rehabilitate structurally distressed concrete pavements, namely, asphalt subsealing and lime-cement jacking. Seven experimental pavement sections of the State highway system, which were subsealed in 1963, and five sections of the New York State Thruway, which were lime-jacked during 1963-64, were included in the study. The evaluation was based on the results of faulting measurements at cracks and joints, precise elevation measurements of the pavement surface, determinations of present serviceability indexes, and surveys of the general condition of the pavement. Wherever practicable, data from these sources were obtained before treatment and at periodic intervals thereafter for a period of approximately one year. The evaluation indicated that asphalt subsealing, such as specified by the

New York Department of Public Works, did not improve the condition of the pavements and that the voids beneath the pavements were not adequately filled. In contract, lime-cement jacking markedly improved pavement condition and manifestations existed that long-term satisfactory performance could be anticipated. On the basis of the results of the study, it was recommended that the Department discontinue the practice of asphalt subsealing to rehabilitate concrete pavements and substitute lime-cement jacking. (Author)

PB-169 824 **Field 13B, 5A, 9B**
CFSTI Prices: HC$8.20 MF$2.25
Preston (E. S.) and Associates, Ltd., Washington, D. C.
APPLICATION OF THE CRITICAL PATH METHOD OF MANAGEMENT CONTROL TO HIGHWAY PROGRAMMING.
Sep 65, 518p Rept. no. 0280

Descriptors: (*Roads, Management control systems), (*Management control systems, Roads), Civil engineer ing, Construction, Programming (Computers), Flow charting, District of Columbia.

Identifiers: Critical path method.

This report describes the application of the Critical Path Method of management control to the process of programing funds for highway needs. The automation of the programing process was emphasized and computer programs are documented in the report which can be used for the operations of data bank information retrieval, multiproject scheduling, scheduling and resource allocation, and reporting. Computer programs which make CPM scheduling computations and create a calendar dated report are also included in the report. Two significant charts are shown in the report. One is a network diagram representing the preconstruction activities of the District of Columbia Department of Highways and Traffic. The other is a system flow chart showing the operating systems approach towards the programing process using the Critical Path Method and electronic computers. (Author)

PB-169 836 **Field 13B**
CFSTI Prices: HC$3.00 MF$0.75
International Road Federation, Washington, D. C.
METHODOLOGY OF INTERNATIONAL HIGHWAY RESEARCH AND DEVELOPMENT EXCHANGE,
Jan 65, 94p Rept. no. 0019
Contract CPR-11-9988

Descriptors: (*Research program administration, Roads), (*Roads, Research program administration), Feasibility studies, Civil engineering, Denmark, Italy, Sweden, West Germany, Scientific organizations.

National highway agencies and laboratories, universities, and other organizations in Denmark, Italy, Sweden and West Germany were visited in the summer of 1964 as part of a pilot study of effective methodology for obtaining information on current highway research and development activities abroad. The tentative methodology developed for this purpose, the distribution of research and development efforts in these countries, and major areas of current interest are described. In addition, activities of national and international organizations known to be engaged in highway research documentation are discussed. Based on experience gained in this initial study, basic questions which need to be resolved in undertaking a more extensive inventory of highway research and development in other countries are delineated, the methodology deemed necessary for the effective conduct of such an inventory is described, and a list of thirty-one additional countries in Europe, Asia, Africa, South America and Australia is recommended for coverage in a proposed second step toward an ultimate goal of a worldwide inventory as a basis for international highway research and development information exchange. (Author)

PB-169 837 **Field 13B, 6C**
CFSTI Prices: HC$2.00 MF$0.50
South Dakota State Univ., Brookings. Dept. of Agronomy.
A STUDY OF THE ENVIRONMENTAL REQUIREMENTS OF PLANTS TO SECURE SATISFACTORY VEGATIVE COVER OF DISTURBED AREAS EXPOSED DURING GRADING OPERATIONS,
by Dwight Hovland and Dean E. Wesley. Dec 64, 43p Rept. no. 0052
Prepared in cooperation with South Dakota Dept. of Highways and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Grasses, Growth), (*Roads, Civil Engineering), South Dakota, Seeds, Fertilizers, Soils, Plants (Botany).

This study explored the effect of seeding depths and dates, soil compaction, species, mulches, fertilizers and companion crops on the establishment of grasses and legumes on five different roadside soil types, and in a greenhouse in South Dakota. It was determined that 70 to 80 pounds of nitrogen and 160-185 pounds of phosphorous per acre should be used with all seedings made on subsoil roadside areas. The effectiveness of straw mulch was lessened as a result of competition from volunteer cereals. Two varieties of wheatgrass and alfalfa should form a part of all seed mixtures. Sowing depths should be within the range from 1/2 inch to 1 inch, in a compaction situation approximating a natural environment, and should be done during the November-May period, preferably in April. (Author)

PB-169 839 **Field 13B, 13I, 13M**
CFSTI Prices: HC$7.00 MF$1.85
Michigan State Highway Commission, Lansing.
A PERFORMANCE INVESTIGATION OF PILE DRIVING HAMMERS AND PILES,
Final rept.
Mar 65, 342p Rept. no. 0112
Proj. 61-F-60
Prepared in cooperation with Bureau of Public Roads, Washington, D. C., Michigan Road Builders Association, Wayne State Univ. and Representative Hammer Manufacturers. See also PB-169 840, PB-169 841.

Descriptors: (*Hammers, Performance (Engineering)), (*Structural parts, Foundations (Structural)), (*Roads, Civil engineering), Michigan, Soil mechanics, Experi mental data, Statistical analysis, Machine tools, Pipes, Loading (Mechanics), Soils, Force (Mechanics), Penetration.

An experimental study of field pile driving operations was made in Michigan which tested air-, steam-, and diesel-powered pile driving hammers on piling of various configurations at sites selected to represent a varied range of soil conditions. Hammer performanee was recorded by conventional methods and also through electronic transducers for experimental determination of force, acceleration, and deflection. Resulting data were evaluated and compared in terms of blow count, pile penetration rate, and 'Enthru' (net energy delivered to the pile top). Selected piles also underwent extensive static loading tests. From data obtained; measured pile supporting capacity was correlated with that estimated from soil boring data secured prior to pile driving. Eleven common dynamic pile formulas were analyzed in light of this correlation of estimated and measured pile capacity. Guidelines are presented for selection of hammers and for good pile driving practice. (Author)

PB-169 840 **Field 13B, 13I, 13M**
CFSTI Prices: HC$4.00 MF$0.75
Michigan State Highway Commission, Lansing.
APPENDIX A: PILE DRIVING RECORDS FOR ALL TEST SITES,
by G. O. Kerkhoff, L. T. Oehler, and W. S. Housel. Mar 65, 105p Rept. no. 0112-App-A
Proj. R-61-F-60
Supplement to "A Performance Investigation of Pile Driving Hammers and Piles". See also PB-169 839.

Descriptors: (*Hammers, Performance (Engineering)), (*Structural parts, Foundations (Structural)), (*Roads, Civil Engineering), Experimental data, Michigan, Soil mechanics, Soils, Effectiveness, Penetration, Force (Mechanics), Pipes, Loading (Mechanics).

The study consists of an extensive field investigation in which a total of eighty-eight piles were driven at three sites. At all three sites, the piles were driven to practical refusal in underlying highly consolidated sand and gravel or hardpan, but the overlying layers represented a variety of soft clays, till clays and granular materials. A selection of pile driving hammers was used, including several light and heavy diesel hammers, air and steam hammers, and a special internal mandrel hammer. Piles were most of the steel H or steel pipe type, although a few patented type steel tubes were also included. Extensive soil profile data was collected prior to driving operations at each site and laboratory shear tests on undisturbed samples were performed. Dynamic measurements of the driving operations were made, including driving force as indicated by a special load cell, accelerations and displacements of the top of the pile. Static load tests were conducted on nineteen of the piles. Analysis of the data included a careful comparison of the driving effectiveness of the various types of hammers as reflected by blow count for equal penetration, penetration rate, and efficiency of energy transmission to the pile. The common pile driving formulas were reexamined to determine their reliability, with the conclusion that they do not permit estimation of pile capacity with any degree of certainty. It was also concluded on the other hand that soil test data, consisting of standard penetration measurements and laboratory shear tests, provide a reliable and accurate basis for estimating static load capacity. (Author)

PB-169 841 **Field 13B, 13I, 13M**
CFSTI Prices: HC$6.00 MF$1.25
Michigan State Highway Commission, Lansing.
APPENDIX B: COMPILATION AND ANALYSIS OF DYNAMIC MEASUREMENTS.
Mar 65, 263p Rept. no. 0112-app-B
Proj. R-61-F-60
Prepared in cooperation with Bureau of Public Roads, Washington, D. C., Michigan Road Builders Association, Wayne State Univ. and Representative Hammer Manufacturers. Supplement to Chapter 8 of "A Performance Investigation of Pile Driving Hammers and Piles". See also PB-169 839.

Descriptors: (*Hammers, Performance (Engineering)), (*Structural parts, Foundations (Structural)), (*Roads, Civil Engineering), Michigan, Experimental data, Statistical analysis, Tables, Programming (Computers), Data, Force (Mechanics), Acceleration.

The report is a compilation analysis of force and acceleration measurements obtained during pile driving, which form the basis for the discussion of hammer energy.

PB-169 845 **Field 13B, 11B**
CFSTI Prices: HC$2.00 MF$0.50
California State Div. of Highways.
FINDINGS FROM THE USE OF COMPENSATED SHRINKAGE PORTLAND CEMENT IN THE LODI FREEWAY EXPERIMENTAL PAVEMENT,
by B. F. Neal and J. B. Hannon. Jun 65, 39p
Rept. no. 0185
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Pavements), (*Pavements, Roads), (*Cements, Pavements), California, Civil engineering, Concrete, Perfor-

mance (Engineering), Aging (Materials), Fracture (Mechanics), Compressive properties, Shrinkage.

An experimental portland cement concrete pavement section designed to evaluate concrete using a type of expanding portland cement referred to as 'compensated shrinkage cement' was incorporated into a Central California highway project known as the Lodi Freeway, in the summer of 1963. This was the second project of its type. The compensated shrinkage cement used on these projects was formulated to produce an expansion to offset or compensate for the drying shrinkage that normally occurs. The concrete in each of the six 1/4-mile units of the Lodi experimental pavement was placed monolithically with no expansion or contraction joints. Pavement and anchors were used in the compensated shrinkage cement units. The only discontinuities were the construction joints at the ends of the 1/4-mile units. Related factors evaluated in conjunction with the use of the special cement were: the effect of air entrainment and the effect of a moist earth blanket cure compared to polyethylene sheet cure. Evaluation of the behavior and the properties of concrete in the experimental sections was aided by the use of Carlson electrical strain gages embedded in the concrete, surface gage points, crack surveys, and testing of field fabricated test specimens. (Author)

PB-169 848 **Field 13E, 13M, 13B**
CFSTI Prices: HC$2.00 MF$0.50
Texas Univ., Austin. Center for Highway Research.
FATIGUE STRENGTH OF 3/4 INCH STUDS IN LIGHTWEIGHT CONCRETE (PUSH-OUT TESTS),
by H. G. Lehman, H. S. Lew, and A. A. Toprac.
May 65, 38p RR-76-1F, 0281
Contract 4413-939,
Proj. 3-5-64-76
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. Research Project: Fatigue Strength of Stud Shear Connectors in Lightweight Concrete (Push-Out Tests).

Descriptors: (*Studs, Fatigue (Mechanics), (*Roads, Materials), Texas, Stresses, Reinforced concrete, Reinforcing materials, Beams (Structural), Composite materials, Loading (Mechanics), Life expectancy.

This report presents the result of fatigue tests of composite structural specimens consisting of lightweight concrete slabs attached to a steel beam with 3/4-inch round headed stud shear connectors. Fourteen push-out specimens were tested to obtain data on the effect of stress range and maximum stress in each range. Slips between the concrete slabs and the steel section were measured during static and fatigue loading. The results are plotted as S-N curves, and compared with the results of similar tests in which regular concrete slabs were used. A comparison is also made between the above tests and beam fatigue tests. The following are the major conclusions which are given. The stress range has a significant effect on the fatigue life of shear studs. In general failure occurred when fractures developed at the heat affected base of the studs. Slip results do not show any immediate relation to the fatigue life of the specimens. (Author)

PB-169 849 **Field 13C, 13B, 8G**
CFSTI Prices: HC$1.00 MF$0.25
California State Div. of Highways.
WEATHERING OF SERPENTINE AGGREGATES,
31 Aug 65, 13p Rept. no 0335
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Minerals, Aging (Materials), (*Roads, Materials), California, Concrete, Materials, Magnesium compounds, Silicates, Performance (Engineering), Rock (Geology).

Identifiers: Aggregate (Materials).

This report deals with the rapid weathering of serpentine aggregates in an autoclave-type device. Samples of serpentine aggregate from three sources were subjected to ten weathering cycles each and the results were compared with the resistance to rapid weathering of a standard aggregate. It was concluded that serpentine aggregates are not highly susceptible to chemical weathering. At this time we have no reason to expect a poor performance from serpentine aggregates that pass all of the required physical tests. (Author)

PB-169 851 **Field 13B**
CFSTI Prices: HC$2.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge. School of Engineering.
MODELLING HIGHWAY LOCATION AS A HIERARCHICALLY-STRUCTURED SEQUENTIAL DECISION PROCESS,
by Marvin L. Manheim. Sep 65, 39p Research rept. R-65-38
Sponsored by Massachusetts Dept. of Public Works in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Site selection), (*Site selection, Decision theory), Probability, Massachusetts, Civil engineering.

Identifiers: Bayes theorem.

Bayes Theorem, a basic formula of probability theory, is applied to the development of a concept for utilizing a probability model to aid the engineer in the series of sequential decisions required in a highway location study. (Author)

PB-169 853 **Field 13B, 5J**
CFSTI Prices: HC$4.00 MF$0.75
Louisiana State Univ., Baton Rouge. Div. of Engineering Research.
EVALUATION OF EFFECTIVENESS OF ROADSIDE DELINEATORS,
by Olin K. Dart, Jr. 1964, 123p Engineering research bulletin-81
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Markers), (*Markers, Effective ness), Civil engineering, Louisiana, Experimental data, Statistical analysis, Motor vehicle operators, Behavior, Safety.

The purpose of this research was to determine if post-mounted delineators on Interstate highways were valuable enough to warrant installation and maintainence. The study techniques used were spot speed and placement of all vehicles, test-driver measurements using motion-picture recording and car-following recorded by motion pictures. A statistical analysis was then made comparing delineators and edge-striping against the non-delineated condition, both day and night, for tangent and curve sections of highway. Driver interviews were conducted along with the traffic observations. The data analysis did not show significant differences that were meaningful from a practical standpoint. Driver interviews did yield conclusive approval of the delineation. The test-vehicle and car-following techniques provided placement profiles of drivers using the study section and the author proposes the use of a Profile Smoothness Index developed from analysis of this data. (Author)

PB-169 854 **Field 13B, 13L, 13M**
CFSTI Prices: HC$2.00 MF$0.50
California State Div. of Highways, Sacramento. Traffic Dept.
EFFECTIVENESS OF MEDIAN BARRIERS,
by Roger T. Johnson. Aug 64, 42p Rept. no. 0010
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Safety, Roads), (*Roads, Structures), (*Structures, Safety), California, Civil engineering, Effectiveness, Wire, Beams (Structural).

The objective of this study was to ascertain whether the employment of physical barriers within the highway median is effective in promoting highway safety. An uncontrolled before and after study of 54.2 miles of urban freeway in California was conducted to determine the effect of cable chain link barrier and double blocked-out metal beam barrier on accident experience. Cable barrier was installed on 26.6 miles and the beam barrier on the remaining 27.6 miles of the study section. The two types of barrier were not installed under comparable geometric design and volume conditions. For example, the beam barrier was used primarily on medians having a width of less than 16 feet whereas the cable barrier was installed where the median width exceeded 16 feet. Findings which warrant mention are as follows: median barriers were effective in preventing cross median accidents; fatal accidents were reduced at barrier locations; injury accidents and total accidents increased at barrier locations; accidents involving the median increased at barrier locations; cable barriers are expensive to maintain. If no cost of repair is recovered by the State from the party responsible for the damage, it requires 13 years for the added maintenance costs to counteract its initial lower construction costs in comparison to the beam barrier. (Author)

PB-169 855 **Field 13B, 5J**
CFSTI Prices: HC$1.00 MF$0.50
Montana State Dept. of Highways.
SIGNING STUDY OF A TYPICAL INTERSTATE BY-PASS,
by Richard A. Nisbet. Dec 64, 13p Rept. no. 0017
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Markers), Montana, Civil engineer ing, Effectiveness, Motor vehicle operators, Behavior, Traffic, Communication systems.

The primary purpose of this study was to determine the effect the sign 'Livingston Next 2 Exits' had on tourist traffic that could by-pass a town of approximately 8,200 population. The study was conducted by the interview method. Other additional objectives that were studied are for what reason do drivers leave the Interstate and why a particular exit. The 'before' and 'after' technique was employed with certain signing changes being made between the phases as requested by the Livingston Chamber of Commerce. The results indicate that a sign 'Livingston Next 2 Exits' had no effect on traffic paterns established before the installation of the sign. This was derived from traffic of which 46% were first time users of the by-pass. Other results show that when two interchanges directly serve a community, the majority of traffic will use the first exit they come to. Also the unfamiliar motorists look for route markers and trailblazers to locate the entrance ramps to the freeway. The report is directed at the small town by-pass problem of signing to attract the unfamiliar motorist. (Author)

PB-169 856 **Field 13L, 5J, 13B**
CFSTI Prices: HC$3.00 MF$0.75
California State Div. of Highways, Sacramento. Traffic Dept.
WRONG-WAY DRIVING: PHASE II.
25 Feb 65, 88p Rept. no. 0085
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Safety), (*Safety, Roads), (*Motor vehicle operators, Behavior), California, Motor vehicle accidents, Vehicles, Operation, Markers, Safety devices.

A study was made to develop means of reducing the amount of wrong-way driving and the number of accidents caused by wrong-way driving. Data were obtained by two methods. The first method utilized a special report completed by enforcement

officers when a wrong-way driving incident was observed. The second method utilized accident data of California freeways and expressways. Wrong-way driving incidents were then compared for two nine-month periods in 1962 and 1964. The data were stratified according to the wrong-way drivers age and sobriety, origin of wrong-way driving maneuver, time of day, and type of geometric design feature at which the wrong-way incident originated. There was a prevalence of drinking drivers among those involved in wrong-way driving incidents and accidents. Also there was a tendency for the rate of wrong-way maneuvers to increase with an increase in the driver's age. Certain ramp types, including the scissors or cul-de-sac type and diamond and hook connection were found to be particularly susceptible to wrong-way movements. Due to this research, improved signs and pavement markings are now being installed at all ramps, transitions to freeways from undivided roads and expressways, and at expressway intersections. As a possible preventive measure, spring loaded spike barriers were tested experimentally and found to be ineffective. A special automatic device (using signs horns, and lights) was developed and is being tested. (Author)

PB-169 857 **Field 13B, 13L**
CFSTI Prices: HC$3.00 MF$0.75
Illinois State Div. of Highways.
GAP AVAILABILITY STUDIES,
by Adolf D. May, Jr. May 64, 98p Rept. no. 12
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Traffic, Control systems), (*Functional analysis, Traffic), (*Roads, Traffic), Illinois, Civil engineering, Illinois, Statistical tests, Automatic, Safety.

The purpose of this research was to determine headway distributions in the right hand lane upstream from an entrance ramp and in combination with gap acceptance findings from previous research, to develop ramp volume metering rates. Three locations were studied for time headway to distributions with central tendency measurements and cumulative frequencies computed. Comparisons were made of the distributions for four volume and occupancy levels, and among locations. Statistical tests were made comparing the collected distributions with the Poisson distribution, the composite Normal-Poisson distribution, and the log normal distribution. Contrary to expectations, estimation of metering rates disclosed that allowable ramp volumes would be higher at high right hand lane volumes. The report also briefly discusses initial experiences with automatic ramp metering and subsequent charges made for the Expressway Surveillance Project. (Author)

PB-169 858 **Field 13B, 17B, 13L**
CFSTI Prices: HC$2.00 MF$0.50
National Proving Ground for Freeway Surveillance Control and Electronic Traffic Aids.
EFFECT OF TELEVISION SURVEILLANCE ON POLICE RESPONSE TIME TO AN URBAN FREEWAY INCIDENT,
by John M. Keryeski and Vasant H. Surti. Jan 65, 28p Rept. no. 0103

Descriptors: (*Television communication systems, Traffic), (*Traffic, Television communication systems), (*Roads, Traffic), Civil engineering, Motor vehicle accidents, Police, Performance (Engineering), Effectiveness, Time, Safety.

This report investigates the improvement in response time by police when television surveillance is used to detect freeway incidents. Improvements in response time to accidents, which have priority, is projected for all incidents in order to minimize possible effects on the flow of freeway traffic. (Author)

PB-169 859 **Field 13B, 13L**
CFSTI Prices: HC$4.00 MF$0.75
Indiana Univ., Bloomington. Dept. of Police Administration.
A STUDY OF SAMPLING ERROR IN SPOT AND TRAVEL SPEEDS,
by R. F. Crowther. Dec 64, 107p Rept. no. 0117
Proj. HPS-HPR-1 (37)
Sponsored in part by Indiana State Highway Commission and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Traffic, Sampling), (*Statistical analysis, Velocity), (*Roads, Traffic), Indiana, Errors, Statistical tests, Reliability, Vehicles, Data, Civil engineering.

This report deals with a statistical analysis of spot and travel speeds to investigate the relationship of sample size and the reliability of speed sampling. A computer analysis was established to examine 462 spot speed samples and 231 trip speed samples obtained at 16 different locations in Indiana. A number of statistical tests were made to determine trends in the data. Tables were developed to establish sample sizes and ordinal confidence limits of the mean and 85 percentile speeds. (Author)

PB-169 860 **Field 13B, 5J**
CFSTI Prices: HC$3.00 MF$0.75
Texas Transportation Inst., Texas A and M Univ., College Station.
ANALYSIS OF ACCESS VIOLATIONS ON CONTROLLED ACCESS FACILITIES.
Final research rept.,
by William E. Tipton. Aug 65, 52p RR-65-1
Proj. 2-1863-65
Prepared in cooperation with Bureau of Public Roads, Washington. Research sponsored in part by Texas State Highway Dept.

Descriptors: (*Roads, Traffic), (*Traffic, Roads), (*Motor vehicle operators, Behavior), Civil engineering, Texas, Safety.

This study gathers information on 986 access control violations on approximately 770 miles of freeway open to traffic in Texas. Three specific objectives were studied: to catalog the types of access violations, to determine their extent and causes, and to determine the effectiveness of various design and control features presently being utilized to prevent access violations. The primary cause of access violations was found to be that the violation route was the most convenient route. A study of the corrective measures presently being used indicated that signs are 78 percent ineffective and that curbs, chainlink fences and posts with barrier cable were very effective. The results indicate that the three major types of access violations were: exit where no exit ramp exists, median crossing, and entrance where no entrance ramp exists. The report points out that the majority of access violations took place on a facility with an average daily traffic less than 6,000 and a low level of enforcement. (Author)

PB-169 861 **Field 13L, 13B, 6I, 6E**
CFSTI Prices: HC$2.00 MF$0.50
California State Dept. of the Highway Patrol, Sacramento.
THE ROLES OF CARBON MONOXIDE, ALCOHOL, AND DRUGS IN FATAL SINGLE CAR ACCIDENTS,
by Bradford M. Crittenden. Nov 65, 30p Rept. no. 0160
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Motor vehicle accidents, Statistical analysis), Carbon monoxide, Alcohols, Addiction, Drugs, Cardiovascular diseases, Males, Females, Mortality rates, Blood analysis, Passenger vehicles, Motor vehicle operators, Traffic, California.

Conclusions: Carbon monoxide was found to be of negligible importance. Drugs were detected in approximately twelve percent of the cases. Seventy-six percent of the male victims had been drinking, and about seventy percent had blood alcohol concentrations in excess of .10 percent. Fifty-one percent of the female drivers had been drinking; forty percent had blood alcohol level of .10 percent or more. The male sample was compared with the experimental sample in the more comprehensive single car study with respect to the variables common to the two studies (three-year average accidents, three-year average convictions, average police contact, percent of blue collar workers, percent unmarried, and percent owning high-risk cars). Of the aforementioned variables, percent unmarried contains single, divorced, and widowed persons and highrisk cars include economy and sports cars and motorcycles. No significant differences were found between the two studies. The average number of previous arrests for drunkeness and alcoholism were found to increase with the alcohol level, indicating habituation and problem drinking. The organic factor element was found to be quite substantial, including approximately 10 percent of the cases originally selected in the field. This group consisted of middle-aged or elderly males, apparently with a strong orientation toward safety. Their involvement in single-vehicle collisions raises the question as to the part they play in multiple-vehicle crashes.

PB-169 862 **Field 13B**
CFSTI Prices: HC$1.00 MF$0.50
California Univ., Los Angeles. Inst. of Transportation and Traffic Engineering.
DEVELOPMENT OF AN EXPEDITIOUS METHOD FOR OFF-SITE TESTING OF FREEWAY SIGN FORMATS (SIGN TESTER).
Final rept.,
by Slade Hulbert and Charles K. Wojcik. Sep 65, 18p RR-41
Sponsored in part by California Highway Transportation Agency in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Markers), (*Markers, Test methods), California, Motor vehicle operators, Behavior, Effectiveness, Configuration, Traffic, Civil engineering.

The Institute of Transportation and Traffic Engineering of UCLA developed and tested a full scale working prototype device to present drivers with a sequence of highway signs while they perform a tracking (steering) task. One hundred and fifty-nine drivers were tested on three configurations of freeway-to-freeway interchange signing. The reactions of these drivers are considered to indicate that the Sign Tester device may be applicable to research of this particular nature. On the basis of this experience with the prototype, a final design was completed for the Sign Tester. (Author)

PB-169 863 **Field 13B**
CFSTI Prices: HC$1.00 MF$0.50
California Univ., Los Angeles. Inst. of Transportation and Traffic Engineering.
SIGNING A FREEWAY TO FREEWAY INTERCHANGE (GUIDE SIGNS).
Final rept.,
by Slade Hulbert. Sep 65, 24p RR-42
Sponsored in part by the California Highway Transportation Agency.

Descriptors: (*Roads, Markers), (*Markers, Test methods), Motion pictures, California, Motor vehicle operators, Behavior, Effectiveness, Errors.

A 16 mm motion picture technique was developed and tested for testing audience responses to freeway-to-freeway interchange signing. A total of 1007 persons were tested on three different films. Each film showed the same interchange but different sign messages. This study concludes that adding a freeway name to the signing did not reduce the proportion of errors by drivers not familiar with the interchange. Additional testing is recommended. (Author)

PB-169 864 **Field 13B, 13A**
CFSTI Prices: HC$4.00 MF$0.75
New York State Dept. of Public Works.
RAILING TYPE BRIDGE LIGHTING,
by J. G. Fred Hiss, Jr. and J. Robert Lambert.
Nov 65, 106p RR-65-7
Proj. 36
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. Rept. on Physical Research Proj.

Descriptors: (*Lighting equipment, Bridges), (*Bridges, Lighting equipment), New York, Civil engineering, Roads, Feasibility studies, Effectiveness, Light, Experimental data, Safety.

Tests were conducted on five types of low mounted railing type lighting fixtures to determine whether it was feasible to use this method of lighting for a particular interchange in the Albany area. Factors investigated included: spacing and mounting height of the fixtures, illumination, roadway brightness, glare, visibility, effects of snow on operation, and costs of installation and operation. It was concluded that installation was feasible and a number of specific recommendations were made. (Author)

PB-169 865 **Field 13B, 13L**
CFSTI Prices: HC$4.00 MF$0.75
California State Dept. of the Highway Patrol, Sacramento.
TRUCK VIOLATION SURVEY. PHASE I OF ROADWAY CHARACTERISTICS AND MANPOWER DEPLOYMENT STUDY,
by Bradford M. Crittenden. Dec 65, 126p Rept. no. 0238
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Tow), (*Cargo vehicles, California), Traffic, Law, Standards, Safety, Test facilities, Roads, Statistical analysis.

Identifiers: Traffic violations.

The objective of this phase of the study was to determine the scope and nature of the problem of statuatory violations by commerical vehicle owners and drivers in California During the study, 2200 trucks were subjected to close scrutiny by trained specialists in the field of commercial enforcement. All violations were noted which failed to conform with California statutes. Commerical violations were defined as those registration, weight, and equipment violations found in commercial vehicles and which are citeable under appropriate provisions of the California Vehicle Code. The violations were divided into nine different catagories ranging from failure to display required identification numbers to those involving defective braking systems. More than 87 percent of the 2200 trucks inspected had one or more violations. The average number of violations was 3.7 per truck, with at least one of these being a brake violation. Lighting violations, including faulty reflectors and turn signals, accounted for about 33 percent of the total found. License violations amounted to approximately 14 percent of the total. (Author)

PB-169 868 **Field 13B, 8G, 8M**
CFSTI Prices: HC$4.00 MF$0.75
Ohio State Univ., Columbus. Engineering Experiment Station.
TERRAIN INVESTIGATION TECHNIQUES FOR HIGHWAY ENGINEERS,
by Olin W. Mintzer and Richard A. Struble. Oct 65, 126p EES-196-2
Sponsored in part by Ohio State Dept. of Highways and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Terrain), (*Terrain, Civil engineering), (*Civil engineering, Roads), Ohio, Geophysical prospecting, Data, Soils.

The investigation involved evaluation and testing of the combination of indirect and direct methods for soil and rock investigations to procure data for preliminary engineering of highway improvements. The selection of the techniques to field test, types of terrain on which techniques were tested, the geophysical surveys test program, summaries of test-site case histories, and the technique combinations to be applied in given terrain types are discussed. The method of application of all the techniques to several terrain types was developed.

14. METHODS AND EQUIPMENT

AD-296 401 **Field 14C, 9E**
CFSTI Price: HC$12.60
American Scientific Corp., Alexandria, Va.
VARIABLE-SPEED RECORDER-REPRODUCER.
Quarterly progress rept. no. 1, 5 May-5 Nov 62. 27 Nov 62, 122p Rept. no. RR-1733
Contract DA-36-039-sc-89067

Descriptors: (*Magnetic recording systems, Variable speed drives), (*Variable speed drives, Magnetic record ing systems), Magnetic tape, Design, Audiofrequency, Audio amplifiers.

The report describes the basic design consideration for this record-reproducer stemming from the peculiarities of contract requirement. Deviations from conventional magnetic recording are described and the necessities of these changes are proved. The unorthodox tape transport system is an evolution from a conventional drive mechanism through the experience gained from Reed's K-3 Variable-speed Magnetic Tape Transcriber to the specifications of this contract. Design and construction changes are described for changes from one-channel operation to a dual-channel system. (Author)

AD-451 306 **Field 14B**
CFSTI Price: HC$4.60
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
AN EXPERIMENTAL INVESTIGATION IN A MODEL TUNNEL TO DETERMINE THE STARTING AND RUNNING PRESSURE RATIO REQUIREMENTS OF THE PWT 16-FOOT SUPERSONIC TUNNEL AT M = 3.5 to 6.0.
Technical documentary rept.,
by F. M. Jackson and P. F. Blanchard. Nov 64, 46p AEDC-TDR-64-240
Contract AF 40(600)-1000,
Projs. ARO-PS2407, ARO-PS3506
N65 16149
Prepared in cooperation with ARO, Inc., Arnold Air Force Station, Tenn.

Descriptors: (*Supersonic wind tunnels, Operation), Pressure, Performance (Engineering), Wind tunnel models, Diffusers, Tests.

A determination of the minimum pressure ratios required for starting and running in the PWT, Supersonic (16S) was required in the Mach number range from 3.5 to 6.0 because of the work now in progress to extend the Mach number range of that facility. Estimates of these requirements were determined by tests in the AWT, Supersonic (1S) model tunnel. For these tests the variable geometry diffuser contained a closed-off scoop, and a model was installed in the test section. The results of these tests indicate that for Tunnel 16S the minimum starting pressure ratio requirements vary from 58 percent normal shock recovery at M = 3.50 to 45 percent at M = 5.85. The minimum running requirements vary from 112 percent normal shock recovery at M = 3.50 to 85 percent at M = 5.85. (Author)

AD-467 990 **Field 14B, 20A, 20M**
CFSTI Prices: HC$5.60 MF$0.50
Polytechnic Inst. of Brooklyn, N. Y.
NOISE THERMOMETRY AT HIGH PRESSURE.
Rept. on High Pressure Chemistry and Structure, by Martin H. Tillinger. Jun 65, 51p Technical rept. TR-1
Contract DA-31-124-ARO(D)-70,
Proj. DA-200105 01B700
AROD 3783:1

Descriptors: (*Noise analyzers, Thermometers), (*Thermometers, Noise analyzers), (*Resistors, Thermometers), (*Thermocouples, High-pressure research), Experimental design, Circuits, Thermo dynamics, Broadband, Eq ations, Fourier analysis.

It has long been known that the emf of thermocouples is a function of the pressure. However, the magnitude of this effect has never been directly measured at very high pressures and temperatures. To measure this effect, the thermal noise voltage developed by a resistor can be used. This thermal noise voltage is a pressure independent, thermodynamic thermometer. The noise thermometer is a differential device which compares the noise output of two resistors, one at high pressure and the other at atmospheric pressure. In order to compare these noise outputs and hence the temperatures, the noise outputs are amplified and their magnitudes are integrated. The difference between the integrated noise magnitudes is proportional to the temperature difference between the resistors. The precision of this thermometer is 0.1 degree at 300K and increases at higher temperatures. (Author)

AD-476 566 **Field 14B, 9A**
CFSTI Prices: HC$6.00 MF$1.50
General Electric Co., Philadelphia, Pa. Missile and Space Div.
ACCELERATED TESTING OF HIGH RELIABILITY PARTS.
Final rept. 10 Jun 64-10 Jun 65,
by T. M. Walsh, H. S. Endicott, G. Best, and H. McLean. Nov 65, 295p
Contract AF 30(602)-3415,
Proj. AF-5519,
Task 551906
RADC TR-65-288-vol-1

Descriptors: (*Accelerated testing, Electronic equipment), (*Electronic equipment, Accelerated testing), Reliability (Electronics), Resistors, Diodes, Transistors, Glass capacitors, Degradation, Metal films, Failure (Electronics), Data.

A review of data and information gathered during previously accelerated test programs has led to the formulation of degradation models for the parts under study. Long-term constant stress tests, which were inactive for a 10 month period after accumulating 5000 to 9000 hours of test time at various stress conditions, were restarted and accumulated an additional 8000 hours. An accelerated test design and analysis plan was formulated which is applicable to all electronic parts which exhibit chemical degradation. Failure mechanisms studies led to the formulation of a current conduction model and breakdown model for glass dielectric capacitors. (Author)

NBS-Handbook 44, 3rd Ed. **Field 14B**
CFSTI Prices: HC$2.00 MF$1.00
National Bureau of Standards, Washington, D. C. Office of Weights and Measures.
SPECIFICATIONS, TOLERANCES, AND OTHER TECHNICAL REQUIREMENTS FOR COMMERICIAL WEIGHING AND MEASURING DEVICES AS ADOPTED BY THE NATIONAL CONFERENCE ON WEIGHTS AND MEASURES.
12 Oct 65, 183p
NBS Handbook 44, 2nd ed., superseded. Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, as C13.11:44/3, $2.00.

Descriptors: (*Standards, Handbooks), (*Weight, Standards), (*Measurement, Standards), Symposia, Tolerances (Mechanics).

NBS Handbook 44--3d Edition, Specifications, Tolerances, and Other Technical Requirements for Commercial Weighing and Measuring Devices, is a revision of the second edition of Handbook 44. This third edition was adopted by the 50th National Conference on Weights and Measures and thus will be given legal status in practically every State in the United States. (Author)

NBS-Misc. Pub.272 **Field 14B**
CFSTI Prices: HC$1.00 MF$1.25
National Bureau of Standards, Washington, D. C.
REPORT OF THE NATIONAL CONFERENCE (50th) ON WEIGHTS AND MEASURES 1965,
by L. J. Chisholm. 1 Apr 66, 242p
Available from Superintendent of Documents, GPO, Washington, D. C. 20402. Hard copy $1.00, MF $1.25. Conference held Washington, D. C. 21-25 Jun 65.

Descriptors: (*Standards, Symposia), (*Weight, Standards), (*Measurement, Standards), United States Government, Commerce, Instrumentation.

Patent 3,229,497 **Field 14E**
SHUTTER TESTING APPARATUS.
Patent assigned to Army,
by Le Roy D. Goldfarb. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Camera shutters, Test equipment), (*Test equipment, Camera shutters), Patents.

The testing system is for checking a shutter mounted on a camera. A light beam projected from the system enters the camera through its lens and shutter and is returned by reflection through the shutter and lens, the duration of the reflected beam being measured by the timing cycle of the shutter. The apparatus is operative without disturbing any portion of the camera. The tester has universal application to all types of cameras.

Patent 3,229,503 **Field 14B, 21I**
HIGH PRESSURE DENSIMETER.
Patent assigned to Navy,
by Donald R. Poole and Donald G. Nyberg. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Densimeters, Liquid rocket propellants), Patents, Fluorides, Vapor pressure, High pressure research, Cryogenics.

The method is for determining the density of liquid rocket propellants which contain fluorides and have high vapor pressure. Cryogenic temperatures are used. A known weight of the liquid is introduced at a low temperature into a variable volume and temperature controlled chamber. The method then involves the use of varying pressures and temperature and calculation of the density.

Patent 3,229,514 **Field 14B**
TORQUE MEASURING DEVICE.
Patent assigned to Navy,
by William W. Williams. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Torsion meters, Design), Patents.

The device accurately determines dynamic or transient torques in the range of a fraction of an ounce-inch on a continually rotating member. A linear variable differential transformer is used as the sensing device. The device includes a cource of alternating current, the transformer, including a primary and two secondary windings surrounding a magnetic core, and a voltmeter.

PB-169 546 **Field 14C, 1C**
CFSTI Prices: HC$2.60 MF$0.50
Federal Aviation Agency, Washington, D. C. Aircraft Development Service.
EVALUATION OF A TAIL LOCATED FLIGHT RECORDER,
Technical rept.,
by Paul M. Rich. Aug 65, 23p FAA-ADS-50
Proj. 530-003-04X

Descriptors: (*Aircraft, Recording systems), (*Recording systems, Transport planes), Commercial planes, Aircraft equipment, Tails (Aircraft), Flight testing, Acceleration, Velocity, Altitude, Time, Pressure.

The performance of a standard flight recorder, mounted aft of the pressurized bulkhead in the tail section of an air carrier transport aircraft was compared with that of a recorder as presently installed during flight. Flight tests were conducted in conjunction with the FAA-NASA project TAPER (Turbulent Air Pilot Environmental Research) utilizing the FAA's Boeing 720. Two flight recorders and associated accelerometers were mounted in the aircraft; one in the cabin area near the center of gravity and one in the tail of the aircraft outside the pressurized bulkhead. The two recorders were modified to record altitude and airspeed as obtained from an altitude/airspeed transducer located near the pitotstatic source. The standard airspeed and altitude channels were supplied by specially installed pitot-static lines running from the nose to the tail of the aircraft. There was no difference between the recordings of the flight recorder located at the c.g. and the recording of an identical recorder located in the tail for the parameters of airspeed, altitude, and heading. However, there was a difference between the acceleration readings of these recorders. Although there was no difference between the altitude and airspeed obtained from the pitot and static lines and the altitude obtained via an altitude/airspeed tansducer, the altitude/airspeed transducer proved more practical. (Author)

PB-169 569 **Field 14B, 9A**
CFSTI Prices: HC$1.60 MF$0.50
Boeing Co., Seattle, Wash. Aero-Space Div.
DYNAMIC BETA TRANSISTOR TESTER MODEL 870 (HICKOK ELECTRICAL INSTRUMENT CO.).
Technical manual instrument calibration procedure AY-18,
1 Dec 65, 16p
Contract N123 (62861)35056A
NAVWEPS 17-20AY-18

Descriptors: (*Test equipment, Transistors), (*Cali bration, Test equipment), Test equipment (Electronics), Instrumentation, Naval equipment, Instruction manuals.

The procedure is given for the calibration of the Hickok Electrical Instrument Company Model 870 Dynamic Beta Transistor Tester. The Test Instrument provides for testing all small, medium and power transistors under typical operating conditions.

PB-169 648 **Field 14B, 13J, 20K**
CFSTI Prices: HC$3.00 MF$0.75
California Univ., Berkeley. Coll. of Engineering.
THE SHIP DYNAMIC TEST MACHINE AT THE UNIVERSITY OF CALIFORNIA, BERKELEY, CALIFORNIA,
by Walter M. MacLean. Jan 66, 95p NA-66-1
Contract MA-2620

Descriptors: (*Test equipment, Ship structural components), (*Ship structural components, Impact shock), (*Dynamics, Ship stuctural components), Pressure, Ship hulls, Ships, Water, Loading (Mechanics), Experimental data.

Identifiers: Ship slamming.

A description is given of a recently completed Ship Dynamic Test Machine which was created for use in the experimental study of local structural response of ship forward bottom structure to water impact loads as found in ship slamming. The complete test facility consists of the test machine, a specially designed and constructed test tank, and an instrumentation van which houses the necessary machine controls as well as the instrumentation and recording equipment. The general characteristics, design and operation of each component is discussed. In addition, test results from the first series of tests are presented and discussed. These results show that the available theories of flat impact do not realistically represent impact conditions even in the carefully controlled experimental situation. The influence of air trapped between the impacting flat surface and the undisturbed free surface of the fluid may be of fundamental importance in determining the magnitude of impact pressures generated. It is further noted that when the water surface is disturbed or rough at the initial stage of an impact, maximum pressures may be higher locally, though generally the total impact force is less. Further careful investigation of these aspects of impact is recommended. (Author)

PB-169 654 **Field 14E, 22B, 4B**
CFSTI Prices: HC$1.60 MF$0.50
Chicago Univ., Ill. Dept. of the Geophysical Sciences.
APLICACION DEL METODO DE FUJITA PARA RECTIFICACION PRECISA DE FOTOGRAFIAS TOMADAS POR EL SATELITE NIMBUS I (Application of Precise Fujita Method of Nimbus I Photo Gridding).
Satellite and mesometeorology research project,
by Ruben Nasta. Jan 66, 19p SMRP Research paper-47
Grant Cwb-WBG-34
Text in Spanish Attached Summary in English. Prepared in cooperation with Argentine Navy.

Descriptors: (*Meteorological satellites, Aerial photography), (*Rectifiers (Photography), Aerial photography), (*Aerial photography, Rectifiers (Photography)), Photogrammetry, Cloud cover, Photographic techniques, Weather forecasting.

Identifiers: Nimbus, Fujita method.

An attempt was made to apply the Fujita Method of satellite photo-gridding in constructing geographic grids on AVCS pictures obtained from Nimbus satellites. Since a set of three pictures was taken simultaneously by three AVCS cameras with their optical axes rigidly fixed to the spacecraft, the distortion-free grids of three images were projected to the image plane of the central camera. The distortion-free fiducial grid, thus constructed to fit Fujita's tilt grids, revealed that the tilts of both the left and right cameras are 36.0 degrees plus or minus 0.1 degrees. The image principal point (IPP) of the right camera is in line with the central east-west measurable error. The IPP of the left camera is, however, located about 0.3 mm below the fiducial line. Moreover, the central fducial line of the left camera was found not exactly parallel to that of the central camera. There are two narrow spaces between three fiducial grids but these spaces are included in the images of two adjacent pictures. It is concluded that this method of precise rectification of Nimbus AVCS photographs will help meteorologists and researchers to analyze synoptic situations which cannot be studied completely and easily by using conventional information only, and will especially contribute to the better understanding of weather phenomena over large bodies of water such as the South Pacific Ocean where practically no meteorological information is available. (Author)

PB-169 684 **Field 14B, 8I**
CFSTI Prices: HC$2.00 MF$0.50
Bureau of Mines, Washington, D. C.
EVALUATION OF A PENETROMETER FOR ESTIMATING ROOF-BOLT ANCHORAGE.
Rept. of investigations,
by Juel H. Stears. 1965, 27p RI-6646

Descriptors: (*Test equipment, Mining engineering), (*Anchors (Structural), Mining engineering), (*Rock (Geology), Anchors (Structural)), Roofs, Bolts, Structural properties, Supports, Underground structures, Safety, Hardness.

Identifiers: Penetrometer.

Research was done to determine if a hydraulically operated penetrometer developed by the Bureau of Mines could be used to estimate the roof-bolt anchorage capacity of mine roof rock. Tests were conducted both in the laboratory using cement cylinders and underground in shale rock. Hardness readings were measured by the penetrometer around the periphery of the bolt holes at the anchorage horizon. Roof bolts were then installed and subjected to an anchorage test. The results showed that the penetrometer readings could be used to determine the optimum stratum for roof-bolt anchorage but could not be used to make an accurate estimate of the anchorage capacity. (Author)

15. MILITARY SCIENCES

AD-414 817 **Field 15C, 15G, 15E, 5A**
CFSTI Price: HC$14.60
RAND Corp., Santa Monica, Calif.
THE WEAPON PLANNING PROBLEM FOR GENERAL PURPOSE FORCES: A FUNCTIONAL APPROACH,
by Harold A. Linstone. Jul 62, 147p RM-3202-ISA
Contract SD-79

Descriptors: (*Decision making, Weapon systems), (*Weapon systems, Decision making), (*Armed forces operations, Weapon systems), Limited war, Department of Defense, Armed forces (United States), Logistics, Deployment, Threat evaluation, Military strategy, Operations research.

This Memorandum suggests a technique to relate equipment to operational needs so that the enumeration of hardware alternatives for general purpose forces is facilitated. There are two basic steps in this functional approach: (1) Enumeration of missions and definition of systems to perform each mission at any desired time point. (2) Development of a set of hypothetical contingency plans representative of the wide variation of operational conditions faced by general purpose forces. The use of flow charts for (1) and equipment lists for (2) is discussed for United States forces. The essence of the approach is the fusing of (1) and (2) to permit the display of system alternatives. Applications to hypothetical decision problems are discussed to illustrate the possibilities and limitations of the technique. Flow charts are also developed for S. Viet Nam forces to indicate its potential value in the consideration of alternatives in the Military Assistance Program. Finally the next logical step in the determination of feasibility of the approach is described. (Author)

16. MISSILE TECHNOLOGY

AD-465 896 **Field 16D, 1A**
CFSTI Prices: HC$4.60 MF$0.50
Army Missile Command, Redstone Arsenal, Ala. Structures and Mechanics Lab.
THEORETICAL EFFECTS OF REENTRY AERODYNAMIC HEATING ON THE EXTERNAL SKIN STRUCTURE OF AMRAD EXPERIMENT NUMBER ONE.
Technical rept.,
by W. G. Burleson and R. A. Reynolds. Apr 65, 44p RS-TR-65-3

Descriptors: (*Aerodynamic heating, Atmosphere entry), (*Atmosphere entry, Reentry vehicles), (*Reentry vehicles, Aerodynamic heating), Conical bodies, Blunt bodies, Heat shields, Surface temperatures, Plastics, Aluminum.

Calculated reentry aerodynamic heating effects on the external skin of an ICBM reentry test vehicle having a relatively low weight-to-drag ratio are presented. The vehicle is a blunt cone with the aft portion designed to fail just after maximum heating and the forward portion designed to survive to impact. The tape-wound, reinforced plastic heat shield is subjected to maximum reentry heating rates between 125 x 10,000 and 650 x 10,000 kcal/sq. m. hr. Resulting external and internal surface temperature histories are given. Effects of extreme trajectory, vehicle characteristics, and atmosphere variations on the aluminum substructure temperature histories are discussed. (Author)

AD-466 996 **Field 16A, 1A**
CFSTI Prices: HC$3.60 MF$0.50
Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
OBSTACLE INFLUENCE IN A WIND TUNNEL,
by J. D. Horn. Jul 65, 33p
Task DA-1V014501B53A-10
ECOM 5000

Descriptors: (*Guided missile launchers, Gas flow), (*Wind, Turbulence), Wind tunnels, Velocity, Structures, Wind tunnel models.

Measurements were made of mean wind flow around models of the Athena launcher housing. These measurements were made in an effort to simulate obstacle effects of wind flow around the actual launcher housing. Wind perturbations occasioned by the launcher housing are considered a possible influence on wind sensor readings from a near-by meteorological pole. A series of mean velocity profiles taken in the lee of the two models in the wind tunnel is presented. Salient features of the profiles are pronounced attenuation below one obstacle height and relatively small changes with downstream distance over the limited range of distances measured. (Author)

Patent 3,229,460 **Field 16D, 21H**
TERTIARY INJECTOR FOR PROPULSION SYSTEM ROLL CONTROL.
Patent assigned to Navy,
by Burton A. Jones. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231. $0.50

Descriptors: (*Thrust vector control systems, Roll), (*Injectors, Thrust vector control systems), (*Guided missiles, Thrust vector control systems), Patents, Secondary injection, Control systems, Motion, Con vergent divergent nozzles, Thrust, Nozzles.

The apparatus provides pitch, yaw and roll control for a rocket propelled missile. The propulsion system includes a thrust nozzle and a secondary injection thrust vector control system. A roll control capability is added to the secondary injection thrust vector control system. An arrangement is shown for deflecting the secondary jet by use of a tertiary injection system.

Patent 3,229,461 **Field 16D, 21H**
FLUID AMPLIFICATION DEVICE FOR PROPULSION SYSTEM ROLL CONTROL.
Patent assigned to Navy,
by Burton A. Jones. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231. $0.50

Descriptors: (*Thrust vector control system, Fluid amplifiers), (*Fluid amplifiers, Thrust vector control systems), Patents, Roll, Control systems, Secondary injection, Thrust, Nozzles, Guided missiles.

The secondary injection thrust vector control and roll control system for missiles is of the type disclosed in patent No. 3,229,460. The secondary system includes pairs of oppositely disposed overexpanded injection nozzles. These nozzles are specially constructed so that the secondary injection jets issuing therefrom are normally directed to intersect the axis of the main thrust nozzle. A control is provided on each nozzle which when actuated forces the primary jet to the opposite wall of the over-expanded nozzle, resulting in a situation in which the jet is directed to a position which does not intersect with the axis of the main nozzle. The jet remains in the off-axis position until the control fluid is turned off.

Patent 3,229,638 **Field 16C, 16D**
AIR-LAUNCH ENVIRONMENTAL SAFING DEVICE.
Patent assigned to Navy,
by Lionel L. Woolston and Bob Norris. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Guided missile components, Arming devices), (*Arming devices, Guided missile components), (*Safety devices, Guided missiles), Patents, Airborne, Guided missiles (Air-to-air), Guided missiles (Air-to-surface), Fluid amplifiers.

The safety device is for a rocket-propelled missile launched from an aircraft for preventing arming of the warhead unless the missile is both under propulsion and in flight. The safety and arming mechanism is designed to be released by the pressure of the gases produced by the combination of the rocket propellant. The pressure developed by the rocket motor does not contact the arming mechanism unless directed to it by dynamic pressure caused by the forward, in-flight movement of the missile.

17. NAVIGATION, COMMUNICATIONS, DETECTION, AND COUNTERMEASURES

AD-475 168 **Field 17B, 9B**
CFSTI Prices: HC$2.60 MF$0.50
Michigan Univ., Ann Arbor. Willow Run Labs.
HIGHER FREQUENCY ULTRASONIC LIGHT MODULATORS.
Summary rept.,
by Edwin E. Henry and Harvey Ring. Nov 65, 21p Rept. nos. 6400-54-T, 7000-23-T
Contracts DA-28-043-AMC-00013 (E), AF 33 (615)-1452,
Proj. DA-1P6-20801-A-175
Rept. on Proj. Michigan.

Descriptors: (*Modulators, Light), (*Light, Modulators), (*Ultrasonic radiation, Modulators), Light communication systems, Bandwith, Transducers, High frequency, Very high frequency, Attenuation, Data processing systems, Optical equipment, Analog computers, Theory.

Identifiers: Michigan project.

Modern communications technology demands ever-increased bandwidth; in ultrasonic light modulators, the maximum possible bandwidth requires the use of the highest possible transducer frequency. In experiments using water as the delay medium, it was found that the practical limit of the carrier frequency is 65 to 70 Mc. This report describes the results of ultrasonic light modulation experiments in which units equipped with resonant-frequency transducers ranging in frequency from 5 to 65 Mc were used, in 10-Mc steps and with the incident light normal to the ultrasonic wave train. These results are compared with predictions computed from a theory by Hargrove. It is found that good agreements between theory and practice exists, when consideration is given to the effects of transducer loading and attenuation. (Author)

Patent 3,229,286 **Field 17I**
FM CW DISTANCE MEASURING SYSTEM.
Patent assigned to Army,
by James Samuel and James Salerno. 11 Jan 66

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Range finding, Radar equipment), (*Continuous wave radar, Frequency modulation), Patents.

A frequency-modulated, continuous-wave range tracking and distance measuring system is disclosed. The accuracy of the radar distance measuring device is independent of fluctuations in the frequency deviation of the frequency modulated signal. An arrangement is shown for maintaining a constant difference frequency between the transmitted signal and the received signal.

Patent 3,229,291 **Field 17D**
SHIP SIMULATOR.
Patent assigned to Navy,
by Paul S. Dell'Aria, John W. Greer, Jr., Andre La Pointe, and Raymond Mountjoy. 11 Jan 66

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Radar decoys, Ships), Patents, Countermeasures, Simulators, Radar reflectors, Balloons, Inflatable structures.

The radar countermeasure causes an image simulating the presence of a ship on interrogating radar. An automatically inflatable, water launchable balloon and gas generator assembly is droped into the water. The balloon contains a radar reflector. The generator is energized by the water and is releasable from the balloon after inflation of the balloon.

Patent 3,229,292 **Field 17D**
SNORKEL SIMULATOR.
Patent assigned to Navy,
by Paul S. Dell'Aria, John W. Greer, Jr., and RaymondMountjoy. 11 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Snorkels, Simulators), (*Radar decoys, Snorkels), Patents, Countermeasures, Radar corner reflectors, Balloons, Inflatable structures, Underwater-to-surface.

The apparatus is for launching a radar countermeasure device from a submarine at great depths as well as from the surface. The device simulates a submarine snorkel. The launching apparatus includes a silent, non-explosive spring actuated control mechanism including time-delay and depth control mechanisms. The device includes an inflatable balloon containing a radar corner reflector.

Patent 3,229,293 **Field 17C, 9E**
FOUR ARM SPIRAL ANTENNA DIRECTION FINDER.
Patent assigned to Army,
by John H. Little and Julius A. Kaiser. 11 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Direction finding, Spiral antennas), (*Spiral antennas, Direction finding), Patents.

The direction finder is useful in the fields of air traffic control, navigation, military electronic countermeasures, and missile tracking. Two-filament and four-filament spiral antennas are used in the embodiments. The device has no directional ambiguity and is sensitive to signals emanating from any direction.

Patent 3,229,633 **Field 17H**
AIRCRAFT TRACKING COLORED SMOKE MARKER.
Patent assigned to Army,
by Woodrow W. Reaves and Kenneth G. Carlon. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Markers, Colored smokes), Airborne, Patents, Mounting brackets.

The device is for holding a colored smoke composition on an aircraft during a high altitude flight. The holder supports cannisters in which replaceable cartridges are mounted. The cartridges consist of a heat-stable organic dyestuff and an oxidizing agent. The colored smoke marker, when fired, permits visual or optical tracking of the aircraft.

PB-169 549 **Field 17G, 14B, 1E**
CFSTI Prices: HC$1.00 MF$0.50
National Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF ILS CHECK LIGHT SYSTEM.
Final rept.,
by Richard W. Cleary. Jun 65. 18p
Proj. FAA-430-210-01V
SRDS RD-65-75

Descriptors: (*Instrument landings, Test equipment), (*Test equipment, Instrument landings), (*Lighting equipment, Airports), (*Flight testing, Instrument landings), Flight instruments, Ground position indicators, Identification, Visual signals, Signal lights, Test methods.

An optical system for flight checking the Instrument Landing System (ILS) was evaluated at the National Aviation Facilities Experimental Center in order to determine the utility of such a system as a source of position information during ILS flight checks. Two beams of light were projected. The top edge of one beam was aligned with the ILS glide slope; the right edge of the other beam was aligned with the runway centerline. A flight check aircraft was navigated along these paths by visual reference to the light source. The accuracy with which an observer in the aircraft could identify the centerline and glide path by observing the check light was determined. Although the ILS Check Light System performed in accordance with the original design requirements, it was determined that this system was unsuitable in meeting the new ILS flight check requirements and it was recommended that the system not be adopted for operational use. (Author)

PB-169 550 **Field 17G, 1C**
CFSTI Prices: HC$2.60 MF$0.50
National Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF SLATE III MARK I.
Final rept.,
by Robert A. Waldmann. Nov 65. 29p
Proj. FAA-242-006-01V
SRDS RD-65-135

Descriptors: (*Transponders, Radar beacons), (*Air traffic control systems, Radar beacons), Flight testing, Airborne, Tests.

Identifiers: Slate III Mark I.

An evaluation of a Small Lightweight Altitude Transmission Equipment, SLATE III Mark I was conducted to determine its suitability for operation in present and proposed air traffic control environments. Flight tests were conducted in the Advanced Radar Traffic Control System (ARTS) environment at the Atlanta Terminal Facility, Atlanta, Georgia, and the Stored Program Alpha-Numeric (SPAN) System environment at the Indianapolis Air Route Traffic Control Center, Indianapolis, Indiana. In addition, a short series of bench tests were conducted at the National Aviation Facilities Experimental Center (NAFEC), Atlantic City, New Jersey. It was concluded that the SLATE III Mark I is suitable for operation in present and proposed air traffic control environments. It was recommended the Federal Aviation Agency promote, within the general aviation community, the use of radar beacon transponders having capabilities similar to the SLATE III Mark I. (Author)

PB-169 551 **Field 17G, 9E, 9A**
CFSTI Prices: HC$3.00 MF$0.75
National Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF ATCBI-3 TRANSMITTER MODIFICATIONS AND OMNI ANTENNA.
Final rept.,
by Robert W. Delaney. Nov 65. 92p
Proj. FAA-242-001-01V
SRDS RD-65-127

Descriptors: (*Air traffic control systems, Design), (*Omnidirectional antennas, Radar beacons), (*Suppressors, Radar beacons), (*Radar transmitters, Air traffic control systems), Specifications, Crystals, Diodes, Electronic switches, Antenna radiation patterns, Antenna lobes, Attenuation, Radar reflections, Performance (Engineering).

A group of prototype modifications of the Air Traffic Control Radar Beacon Ground Station Model ATCBI-3 were evaluated to determine the validity of the design requirements as a basis for product specifications. One set of the modifications, including an SLS Omni-Directional Antenna, Type I, was tested at the Atlanta Airport Traffic Control Tower, Atlanta, Georgia; another set of the same modifications, including an SLS Omni-Directional Antenna, Type II, was tested in the vicinity of the National Aviation Facilities Experimental Center (NAFEC), Atlantic City, New Jersey. The report describes modifications designed to introduce side-lobe suppression (SLS) features, improve the selection and interlacing of interrogation modes, add beacon-sync trigger and mode-trigger output capability, and provide the transmitter with additional pulse power capacity. Emphasis was given to comparison of the design requirements with the actual levels of interrogation-pulse and SLS-pulse power measured during instrumented flights within a representative beacon environment. It was concluded that the design requirements for the prototype modifications are generally valid as a basis for product specifications but must be refined so as to limit the attenuation of SLS pulses within the SLS Crystal Diode Switch. It was also concluded that the modification for additional transmitter power is not required.

PB-169 552 **Field 17G, 9E**
CFSTI Prices: HC$2.00 MF$0.50
National Aviation Facilities Experimental Center, Atlantic City, N. J.
EXPERIMENTAL TESTING OF THE IMPROVED 3-PULSE INTERROGATION SIDE LOBE SUPPRESSION SYSTEM.
Final rept.,
by George F. Spingler. Nov 65. 48p
Proj. FAA-242-001-01X
SRDS RD-65-139

Descriptors: (*Suppressors, Radar beacons), (*Radar reflections, Air traffic control systems), (*Air traffic control systems, Suppressors), Transponders, Radar reflections, Radar transmitters, Omnidirectional antennas, Radar antennas, Antenna lobes.

Experimental testing of an Improved 3-Pulse Interrogation Side Lobe Suppression (SLS) System was conducted by the National Aviation Facilities Experimental Center (NAFEC) at three Radar Beacon System sites to determine system performance characteristics and suitability for operational use. The Improved 3-Pulse SLS System was designed to increase the signal level of the first interrogation pulse received by an aircraft transponder and thereby minimize transponder replies to interrogations from reflections. A method of transmitting the interrogation pulse from the Radar Beacon System omni-directional and directional antenna was developed. The proper interrogation pulse level required to be radiated from the omni-directional antenna to obtain proper suppression of reflected replies was determined by tests. In addi-

tion, the adaptability of the modified Air Traffic Control Beacon Interrogation Transmitter (ATCBI-3) to the Improved 3-Pulse SLS System was also analyzed and a field trial of the system was accomplished. It was concluded that the Improved 3-Pulse SLS System is effective in reducing the quantity of transponder replies to interrogations resulting from reflections and is suitable for application in the Air Traffic Control Radar Beacon System.

PB-169 635 **Field 17G, 22B, 9A**
CFSTI Price: HC$4.60
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
DESIGN OF THE TRANSIT SATELLITE ELECTRONICS SYSTEM,
by J. W. Hamblen and J. B. Oakes. Sep 60, 42p
TG-394
AD 254 679

Descriptors: (*Navigation satellites, Electronic equipment), (*Circuits, Navigation satellites), Instrumentation, Glass textiles, Honecomb cores, Sandwich construction, Structural shells, Doppler systems.

Identifiers: Transit.

Four orbital attempts have been made thus far in the Transit program; two of these have been successful. The purpose of this TG is to outline the circuitry used aboard these two satellites.

PB-169 664 **Field 17G, 1C**
CFSTI Prices: HC$7.60 MF$0.75
Bendix Corp., Teterboro, N. J. Flight Control Lab.
COMMERCIAL INERTIAL NAVIGATION SYSTEM. PREDICTED ACCURACY OF THE BANC-461/LN-12 INERTIAL NAVIGATION SYSTEM WHEN INSTALLED IN A DC-8 AIRCRAFT.
Interim rept.
31 Aug 65, 73p
Contract FA-64-WA-5208.
Proj. 350-101-02N
RD 65-126

Descriptors: (*Inertial navigation, Commercial planes), (*Commercial planes, Inertial navigation), Mathematical models, Errors, Numerical analysis, Instrumentation, Jet planes, Automatic pilots, Navigation computers.

Identifiers: BANC 461/LN-12 Inertial Navigation System, DC-8 Aircraft.

This interim report presents the results of an error analysis study (using a mathematical model) of the BANC 461/LN-12 Inertial Navigation System installed in a DC-8 aircraft. This study was undertaken to describe the theoretical performance of the first automatic autopilot coupled inertial navigation system installed in a commercial jet aircraft engaged in regular passenger service. Specifications for subsystem error were furnished by the manufacturers; Bendix Corporation and Litton Systems, Inc. The DC-8 airframe/autopilot response was approximated by the turn coordination dynamics. Tracking performance was predicted using the mathematical model and numerical analysis techniques. Curves of cross-track and along track predicted errors are given for a typical Atlantic crossing leg. (Author)

18. NUCLEAR SCIENCE AND TECHNOLOGY

AD-412 984 **Field 18C, 20N**
CFSTI Price: HC$1.10
RAND Corp., Santa Monica, Calif.
ELECTROMAGNETIC RADIATION FORM A NUCLEAR EXPLOSION IN SPACE,
by W. J. Karzas and R. Latter. 5 Feb 62, 9p
RM-2849
Availability: Published in Physical Review v126 n6 p1919-26 15 Jun 1962. Copies to DDC users only.

Descriptors: (*Electromagnetic waves, Nuclear explosions), (*Nuclear explosions, Electromagnetic waves), (*Compton scattering, Nuclear explosions), Electrons, Gamma rays, Radio signals, High frequency, Detection, Space environmental conditions.

The gamma rays from a nuclear explosion in space Compton-scatter electrons near the surface of the device or in a surrounding material shield. The scattered electrons leave the surface and are accelerated back toward it by the positively charged matter. Provided they are asymmetrically distributed, the accelerating electrons radiate an electromagnetic signal. The electron motions are analyzed, the electromagnetic signal is estimated, and its detectability is discussed. For a typical nuclear explosion, the electromagnetic signal is independent of the yield and contains frequencies up to 10 to 100 Mc/sec and thus will penetrate the ionosphere. Taking into account dispersion by the ambient interplanetary plasma (about 100 electrons/cc), the peak electric field strength at a distance R kilometers from the explosion is about 10000/R to the 1/2 power v/m. The pulse length is about 10 to the -10 power R sec. If only background cosmic noise limits detectability of the signal, the maximum detectable range is about 10 to the 6th power. (Author)

AD-414 345 **Field 18C, 21B, 13L, 19D**
CFSTI Price: HC$2.60
RAND Corp., Santa Monica, Calif.
THERMAL RADIATION FROM NUCLEAR EXPLOSIONS,
by Harold L. Brode. Aug 63, 23p P-2745

Descriptors: (*Thermal radiation, Nuclear explosions), (*Nuclear explosions, Thermal radiation), (*Fires, Nuclear explosion damage), Fire safety, Combustion, Absorption (Physical), Atmosphere, Atomic clouds.

A description of the explosion phenomena which determines the amount and character of the thermal radiation is presented together with the effects of atmospheric transmission and altitude of burst. The factors governing the response of materials to thermal radiation are outlined, and the nature and extent of large scale fires from nuclear explosions are discussed. (Author)

AD-429 404 **Field 18C, 20N**
CFSTI Price: HC$2.60
RAND Corp., Santa Monica, Calif.
ELECTROMAGNETIC SIGNALS PRODUCED BY LOW-ALTITUDE NUCLEAR EXPLOSIONS,
by W. J. Karzas and R. Latter. Dec 63, 30p RM-3884-PR
Contract AF 49 (638)-700

Descriptors: (*Electromagnetic waves, Nuclear explosions), (*Nuclear explosions, Low altitude), Gamma rays, Mathematical models, Partial differential equa tions, Integral transforms, Vector analysis.

The general nature of the electromagnetic signals from nuclear explosions, as they appear at great distances, is reasonably understood. However, near the explosions, in the region ionized by the gamma rays, the electromagnetic phenomena have been less explored experimentally and are less well understood theoretically. The present report bears on the phenomena in this near-in region. Specifically, a simplified model of the explosion is treated analytically. The model assumes the explosion takes place at a height h above an infinitely conducting ground. The ambient air is assumed to have a uniform and constant conductivity, and the explosion is approximated as a point source of gamma rays. This model is solved analytically for the magnetic field at any point about the explosion. Some numerical results illustrate the time and space variation of the magnetic field. (Author)

AD-440 292 **Field 18H, 7E, 20L**
CFSTI Price: HC$3.00
General Atomic, San Diego, Calif.
TRANSIENT RADIATION EFFECTS.
Final rept. 15 Apr 62-15 Apr 63,
by D. M. J. Compton and R. A. Poll. 12 Apr 63, 85p GA-4164
Contract DA-49-186-ORD-939
This program is being continued under Contract DA-49-186-AMC-65 (X).

Descriptors: (*Radiation damage, Theory), (*Photo conductivity, Transients), (*Secondary emission, Measurement), Plastics, Films, Electrical conductance, Electrical insulation, Liquids, Failure (Electronics), Metals, Electrons, Electron beams, Space charges, Gamma rays, Dosimeters, Heating, Gases, Semiconduc tors, Carriers (Semiconductor), Germanium, Silicon, Scattering, Electronic equipment.

The results of a series of studies on the mechanisms of transient radiation effects in materials and components are reported. Topics include: Radiation-induced conductivity in plastic films; induced conductivity in bulk insulators; and in insulating liquids; secondary emission of electrons from metals; effects of electron beam space charge; buildup of electrons in a beam of gamma rays; gamma-ray dosimetry; effects of heating; radiation-induced conductivity in gases; carrier generation in semiconductors; calculation of high-energy secondary emission; interelectron scattering in quasi-intrinsic germanium and silicon; mechanisms of transient radiation effects in electronic parts.

Patent 3,229,523 **Field 18D, 14B, 20A**
APPARATUS EMPLOYING VIBRATORY ENERGY.
Patent assigned to AEC,
by Charles A. Boyd and Herbert Kartluke. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Liquid level gages, Sound), (*Nuclear reactors, Liquid level gages), Patents, Ultrasonic radiation, Tranducers, Resonant frequency, Liquid metals.

The liquid level probe is generally applicable to liquid level determinations. It is particularly useful in the operation of nuclear reactors fueled with molten salt or liquid metals. An elongated sonic wave conductor or transducer coupling system is provided. The system may be constructed to operate in resonance at a frequency of 28,000 cycles per second.

Patent 3,230,036 **Field 18G**
METHOD FOR SEPARATING AMERICIUM AND CURIUM FROM THE LANTHANIDE RARE EARTHS AND YTTRIUM.
Patent assigned to AEC,
by Frederick A. Kappelmann and Boyd S. Weaver. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50.

Descriptors: (*Americium, Solvent extraction), (*Curium, Solvent extraction), (*Solvent extraction, Transuranium elements), Bare earth elements, Yttrium, Patents, Organic phosphorus compounds, Solutions, Carboxylic acids.

The solvent extraction process is useful in separating highly radioactive elements from each other. Monoacidic organophosphorus compounds are used to extract yttrium and the lanthanide rare earths from an aqueous solution containing an organic acid and an aminopolycarboxylic acid, leaving americium and curium in the aqueous phase.

Patent 3,230,146 **Field 18I**
CORE HAVING MEANS FOR VARYING INCLINATION OF FUEL ASSEMBLIES.

Patent assigned to AEC,
by Eugene R. Astley and Lester M. Finch. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Reactor control, Reactor cores), Rotation, Control systems, Reactor fuel elements.

The nuclear reactor comprises a plurality of spaced elongated fuel assemblies which are disposed around a central axial fuel assembly. Structure is provided for holding the lower ends of the fuel assemblies immobile. The upper portions of the fuel assemblies extend through a plate. The upper plate is rotatable.

Patent 3,230,147 **Field 18I**
METHOD AND APPARATUS FOR CONTROLLING REACTIVITY OF NUCLEAR REACTOR.
Patent assigned to AEC,
by Anthony J. M. Hitchcock. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Reactor control, Control rods), Patents, Control systems.

The nuclear reactor has at least a partially solid nuclear reactor core structure defining at least one elongate channel extending through a cross section of the core structure and a control rod wholly of non-fissile neutron absorbing material extending in the channel to control the reactivity of the nuclear reactor during operation thereof. An arrangement is shown for inserting the control rod from one end thereof into the channel and moving the control rod longitudinally along the length of the channel during the operation to variably control the reactivity along the cross section. The control rod is made of four parts or sections.

Patent 3,230,150 **Field 18J**
METAL-CLAD FUEL ELEMENT WITH COPPER FOIL INTERLAYER.
Patent assigned to AEC,
by William R. Martin and James R. Weir. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Reactor fuel element, Reactor fuel cladding), Patents, Copper, Foils, Sandwich construction, Uranium compounds, Dioxides, Stainless steel, Pipes.

The nuclear reactor fuel element includes a ceramic fuel core, an external cladding and a thin layer of copper between the core and the cladding. The structure prevents permanent, axial elongation of the ceramic fuel pellets in the fuel element during reactor thermal cycling.

Patent 3,230,151 **Field 18J**
FUEL ELEMENT FOR A NUCLEAR REACTOR.
Patent assigned to AEC,
by Loring E. Mills, Joseph J. Hauth, Clarence H.Bloomster, and David F. Carroll. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Reactor fuel elements, Uranium compounds), Dioxides, Patents, Ceramic materials, Pipes, Zirconium alloys, Tin alloys, Wire.

Identifiers: Zircaloy-2.

A plurality of sintered natural uranium dioxide fuel pellets having an axial void therein are enclosed in a zircaloy-2 tube which is closed at one end with an end cap. A bare wire of plutonium, 15 percent zirconium alloy is inserted into the void. The open end of the tube is then closed by welding an end cap onto it. A new wire may be inserted in the void to rejuvenate the fuel element.

Patent 3,230,152 **Field 18J, 13D**
COMPARTMENTED NUCLEAR REACTOR FUEL ROD AND METHOD OF MAKING.
Patent assigned to AEC,
by Frank Kerze, Jr. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Reactor fuel rods, Packings), Patents, Disks, Pipes, Seals (Stoppers).

The fuel rod is adaptable for use in pressurized or boiling water reactors. The fuel rod has an elongated tubular jacket containing fuel pellets. Dished spacing disks are in wedged contact with the interior wall of the jacket and form longitudinal compartments for the pellets.

PB-169 217 **Field 18I, 21F**
CFSTI Prices: HC$3.00 MF$0.75
Kjeller Research Establishment (Norway). Institutt for Atomenergi.
SEMI-ANNUAL PROGRESS REPORT, JANUARY-JUNE 1965,
by Bjarne Aabakken. Oct 65, 91p KR-97

Descriptors: (*Nuclear engineering, Norway), Nuclear propulsion, Merchant vessels, Reactor theory, Chemistry, Metallurgy, Reactor safety systems, Health physics.

PB-169 342 **Field 18G, 7A**
CFSTI Prices: HC$6.00 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
SORPTION DU 90Sr SUR UN OXYDE D'ALUMINUM (Sorption of 90Sr by an Aluminum Oxide),
by Roger Rzekiecki. Nov 65, 66p CEA-R-2851
Text in French; Attached Summary in English.

Descriptors: (*Radioactive wastes, Sorption), (*Strontium, Sorption), (*Aluminum compounds, Oxides), (*Sorption, Strontium), Alkaline earth metals, Ions, Radioactive isotopes, Separation, France.

Identifiers: Adsorbents, Aluminum oxide.

The sorption mecanism of an alkaline-earth bivalent cation on activated aluminum oxide is compared to the sorption mecanism of a monovalent ion. The selective retention of the alkaline-earth cation is made use of to remove trace amounts of Sr90 from radioactive waste waters. A kinetic study is reported leading to the calculation of an industrial column. (Author)

PB-169 343 **Field 18B, 7E**
CFSTI Prices: HC$3.60 MF$0.50
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
CONTRIBUTION A L'ETUDE DE L'EFFET SZILARD-CHALMERS DANS LE FERROCYCNURE DE POTASSIUM (Contribution to the Study of the Szilard-Chalmers Effect in Potassium Ferro-Cyanide),
by Brigitte Meriadec. Jan 66, 34p CEA-R-2873
Text in French; Attached Summary in English.

Descriptors: (*Isotope separation, Iron), (*Potassium compounds, Cyanides), (*Iron, Recoil atoms), Separation, Ions, Radioactive isotopes, Chemical analysis, Complex compounds, France.

Identifiers: Potassium ferrocyanide, Szilard-Chalmers method.

With a view to studying the Szilard-Chalmers effect in potassium ferrocyanide, a chemical separation method was developed for the different ions formed by recoil: Fe (2+), Fe (3+) and the complex forms of iron. A measurement method was developed also for analyzing separately the isotopes Fe55 and Fe59, and determining the relative amounts of these two isotopes in the different chemical states. The experimental results show that the activity of the two isotopes is distributed differently between the complex forms of iron, the ferrous ions and the ferric ions. This difference is of the order of 40 per cent in the ferrous solution and of 2 to 5 per cent in the ferric retention and ferric solution. (Author)

PB-169 345 **Field 18G**
CFSTI Prices: HC$2.60 MF$0.50
Commissariat a l'Energie Atomique, Chusclan (France). Centre de Production de Plutonium de Marcoule.
DOSAGE DES PRODUITS DE FISSION DANS LES EFFLUENTS DU TRAITEMENT DES COMBUSTIBLES IRRADIES (METHODE RADIOCHIMIQUE) (Dosage of Fission Products in Irradiated Fuel Treatment Effluents (Radio-Chemical Method)),
by Jacqueline M. Auchapt. Feb 66, 25p CEA-R-2553
Text in French; Attached Summary in English.

Descriptors: (*Reactor fuel processing, Fission products), (*Radioactive wastes, Dosage), (*Fission products, Dosage), Strontium, Cesium, Cerium, Zirconillin.

The absorption spectra for certain steroid and catechol derivatives in the range from 185-300 mu. in the vapor state is compared to the absorption spectra of these compounds observed in solvents. It is pointed out that better resolution and higher sensitivity is observed in the vapor state. Elevated temperatures are used to vaporize these compounds and a practical cuvette and heating means are described for this purpose. At elevated temperatures certain bands visible at low temperatures are wiped out in the range of approximately 230 mu. However, other bands of high degree of absorptivity appear at from 185-210 mu. The spectra of derivatives of desoxy corticosterone, cortisone, estradiol, estrone, veratrole and vanillin are explored. A literature survey of methods for steroid assay is included. (Author)

PB-169 346 **Field 18J, 11F**
CFSTI Prices: HC$5.60 MF$0.50
Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.
CONTRIBUTION A L'ETUDE DU SYSTEME URANIUM-CARBONE-OXYGENE (Contribution to the Study of the System Uranium-Carbon-Oxygen),
Doctoral thesis in French,
by Jean-Pierre Morlevat. 1966, 56p CEA-R-2857
Text in French; Attached Summary in English.

Descriptors: (*Uranium, Phase studies), Oxygen, Carbon, Eutectics, Carbides, Dioxides, Uranium compounds, Grain structures (Metallurgy), France.

Identifiers: Uranium carbides, Uranous oxide.

The region U-UC-UO2 of the U-C-O diagram was investigated by the saturation method. This system is of the ternary eutectic type, the eutectic point lying close to pure uranium. The UO2-UC plane can be considered as pseudobinary; it involves a eutectic UO2-U (C,O) melting at about 2250C. The oxicarbides U (C,O) precipitated from the melt can be considered as stoichiometric (C + O/U=I) with a formula close to UC0.65O0.35 for deposition temperatures below 2200C. (Author)

PB-169 347 **Field 18J, 11F**
CFSTI Prices: HC$7.60 MF$0.75
Centre d'Etudes Nucleaires. Commissariat a l'Energie Atomique, Saclay (France).
DEFORMATION PAR TRACTION DE L'URANIUM MONO- ET POLYCRISTALLIN ENTRE 20C ET -196C (Tensile Deformations in Mono- and Polycrystalline Uranium Between 20C and -196C.

Doctoral thesis in French,
by Andre Lemogne. 1966, 75p CEA-R-2819
Text in French; Attached Summary in English.

Descriptors: (*Uranium, Deformation), Tensile properties, Single crystals, Creep, Brittleness, Fracture (Mechanics), Stresses, Transformations, Strength, Rupture, Grain structures (Metallurgy), Low-temperature research, France.

Tensile stress tests were carried out at low temperatures (between 20C and -196C) on monocrystalline and polycrystalline uranium of various purities. The mechanical properties of the monocrystals were related, at all temperatures, to plastic flow mechanisms. Below -100C brittle fracture occurs on the planes making up the twins. A detailed study of the plastic behaviour at -196C made it possible to show that almost all of the twin planes were liable to become priveleged planes for brittle fracture. The mechanical properties of the polycrystals, the breaking stress and the elongation at breaking point, decrease as the temperature decreases from 20 to -196C; they undergo a transition however - not to be confused with the ductile-brittle transition-whose position and strength depend on the grain size and on the purity. It was verified also that Petch's law is approximately applicable to the plastic flow and rupture stresses; a study was also made of the influence of temperature and purity on the constants occuring in this equation. Finally, experiments at-196C on the deformation up to breaking point of polycrystalline samples cold-worked at 20C have shown the importance of the role played intergranular cracks in the plastic behaviour of uranium. (Author)

PB-169 354 **Field 18D, 20H**
CFSTI Prices: HC$7.60 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre D'Etudes Nucleaires.
SPECTROMETIRE BETA PAR DETECTEUR A JONCTION, APPLICATION A L'ETUDE DES SPECTRES DU 14 C ET DU 35 S (Development of a Junction Beta-Spectrometer).
Doctoral thesis in French,
by Akira Hashizume. 1966, 79p CEA-R-2839
Text in French; Attached Summary in English.

Descriptors: (*Nuclear radiation spectrometers, Semiconductor devices), (*Beta-ray spectroscopy, Nuclear radiation spectrometers), (*Carbon, Beta-ray spectrum), (*Sulfur, Beta-ray spectrum), Crystal counters, Silicon, Resolution, Radioactive isotopes, Cesium, Cerium, Gold, Bismuth, Internal conversion, Calibration, Programming (Computers), France.

A beta-spectrometry unit using junctions of the silicon surface barrier type was built. The resolving power of this spectrometer was studied as well as the influence of a certain number of parameters (temperature, polarization voltage) on its characteristics. A study with this unit of some internal conversion electron spectra (Sn113, Cs137, Ce139, Au195, Bi207) led both to a determination of its characteristics and of an energy calibration, and to the determination of certain internal conversion ratios of these radionucleides. This spectrometer was then used for a study of beta-spectra in particular that of S35 and C14. The calculations and corrections required for the setting-up of Kuries representation are described. The programmes required for the carrying-out of these calculations with an I.B.M. computer are given. It was verified that Kuries representation for C14 above 90 keV is in fact linear. The non-linear aspect observed by certain authors is probably due to the 'quality' of the sources used. The Fierz interference term was determined. The maximum beta-energies found are respectively: 167 plus or minus 1 keV for S35 and 155 plus or minus 2 keV for C14. (Author)

19. ORDNANCE

AD-464 010 **Field 19A, 19D**
CFSTI Price: HC$1.60
Naval Ordnance Lab., White Oak, Md.
SHOCK SENSITIVITY AND HAZARD CLASSIFICATION.
Summary rept.,
by Irving Jaffe. 20 Apr 65, 16p NOLTR-65-47
Task BuWeps-RMMP-22149/F009-06-11

Descriptors: (*Fuel oil, Detonations), (*Ammonium compounds, Nitrates), (*Explosive materials, Detona tions), Hazards, Sensitivity, Shock (Mechanics), Tests.

Identifiers: Ammonium nitrate, Nitrocarbonitrate.

The shock sensitivity of a fuel oil-ammonium nitrate mixture (nitrocarbonitrate) is less than zero cards on the large scale gap test, but 122 cards on the 'extended' gap test. The latter test value results from the ease of initiating the reaction whereas the no-go on the standard test results from the very small damage caused by the detonation reaction. It is suggested that the hazard classification of nitrocarbonitrate be class A or mass detonating because of the ease with which this reaction is initiated. (Author)

AD-467 083 **Field 19D, 21I**
CFSTI Prices: HC$3.60 MF$0.50
Naval Ordnance Lab., White Oak, Md.
MEASUREMENT OF IMPACT SENSITIVITY OF LIQUID EXPLOSIVES AND MONOPROPELLANTS.
Summary rept.,
by Donald Levine and Carl Boyars. 20 May 65, 33p NOLTR 65-54
Task RRRE-06016-F009-06-05

Descriptors: (*Nitroglycerin, Sensitivity), (*Mono propellants, Sensitivity), Impact shock, Measurement, Explosive materials, Detonations, Drop testing, Pressure, Bubbles, Ignition, Photographic analysis.

Instrumentation of a standard drop-weight tester to give pressure-time records and further modification to permit high speed photography have allowed intimate study of the impact-initiation-explosion process in nitroglycerin. A plot of peak impact pressure versus concentration of conventional desensitizer (in nitroglycerin) gives a continuous, nearly linear relationship. The ratio of peak impact pressure to initial pressure is a most significant factor in determining probability of explosions of nitroglycerin. This is consistent with quasi-adiabatic compression of air bubbles as a step in the mechanism of initiation. The photographic studies support this mechanism, showing compression, breakdown of bubble structure (thereby causing more efficient heat transfer to the surrounding liquid), an induction period, and ignition starting in hot spots at the site of the bubble. (Author)

AD-468 095 **Field 19C, 8M**
CFSTI Prices: HC$6.60 MF$0.75
Institute for Defense Analyses, Arlington, Va. Research and Engineering Support Div.
THE PROBLEMS OF OFF-THE-ROAD MOBILITY,
by Alfred W. Jones. Jul 65, 66p Research paper P-189, IDA/HQ-65-3795
Contract SD-50,
Task T-12

Descriptors: (*Armored vehicles, Mobility), (*Pas senger vehicles, Mobility), (*Terrain, Trafficability), Soil mechanics, Performance (Engineering).

Identifiers: M-113 vehicles.

Off-the-road mobility was studied with regard to military vehicles. The study comprised an examination of the complete performance record of a typical vehicle (the M113 Armored Personnel Carrier), the nature of a typical ground vehicle field trail testing (Swamp Fox II), and the most advanced theories in land mobility.

Patent 3,229,399 **Field 19F**
HANGFIRE INDICATOR FOR AUTOMATIC FIRE ARMS.
Patent assigned to Army,
by Earle M. Harvey. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Automatic weapons, Safety devices), (*Safety devices, Automatic weapons), Patents, Mal functions, Identification, Small arms.

An indicator is provided for quickly and positively indicating, when firing is interrupted, whether a cartridge is chambered in the barrel and if so whether its primer has been detonated. Trouble is easily ascertainable by lifting cover so that the relationship of top end to the surrounding surface of bolt can be checked and, unless indicator pin shows that primer has been detonated, attempts to resume firing may be immediately initiated by recharging machine gun. Consequently, time, which may be critical, is saved.

Patent 3,229,561 **Field 19A, 13H, 13I**
METHOD AND APPARATUS FOR ASSEMBLING AND DISASSEMBLING VARIOUS ARTILLERY AND MORTAR SHELLS.
Patent assigned to Army,
by Thomas D. Jones and John L. Sipple. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Projectiles, Manufacturing methods), Canister projectiles, Machines, Patents, Safety, Mortar ammunition.

The method is for assembling a plurality of preassembled high explosive items into an empty shell having an open base end and an open nose end. After the shell is loaded a base plug is attached to the shell. A canister type smoke shell loaded with ten canisters is shown.

Patent 3,229,632 **Field 19H, 20A**
EJECTOR BREECH AND FIRING SYSTEM.
Patent assigned to Navy,
by Vance F. Boswell and Robert L. Shoemaker. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Projectors (Ordnance), Markers), Patents, Breech mechanisms, Firing mechanism (Weapon), Ejectors (Ordnance), Remote control systems, Towed bodies, Underwater sound generators.

The firing and explosive ejector system is for launching and timely energizing acoustical marker devices from a towed marine carrier vessel or from a free-running self-propelled vehicle. A ship console circuit and ejector circuit are associated with the launcher, an explosive ejector and ejector mount.

Patent 3,229,637 **Field 19G**
BALLISTIC MISSILE.
Patent assigned to Army,
by William A. Mrazek. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Rockets, Ballistics), Stability, Patents, Rocket heads, Separation.

The missile is designed for flight according to a predetermined trajectory with an intermediate portion of the trajectory outside the atmosphere of the earth. The head falls on a target. The missile includes a head carried by a booster. The head carries the payload and the booster includes the plane. Contours of x and y, the real and imaginary

power plant. The head has its center of gravity disposed forwardly of its center of aerodynamic pressure to produce the restoring torque of the head in the terminal portion of the trajectory.

Patent 3,229,657 **Field 19H, 17A**
ECHO RANGING TORPEDO.
Patent assigned to Navy,
by Harvey Brooks and Arthur N. Butz, Jr. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Acoustic torpedoes, Doppler systems), Patents, Echo ranging.

The echo steering system is for a torpedo. Two dimensional guidance is derived from an echo from a target which is in motion relative to the water. The input circuit distinguishes between echoes from moving targets and echoes from stationary targets by the difference in Doppler frequency there between, which input circuit provides a reference voltage of a frequency equal to the mean frequency of reverberation from the surrounding medium, and of an amplitude correlative with the intensity thereof.

PB-169 124 **Field 19G, 22C**
CFSTI Prices: HC$2.00 MF$0.50
Smithsonian Institution, Cambridge, Mass. Astrophysical Observatory.
OBSERVATION OF THE GT-5 ROCKET-BODY REENTRY-PRELIMINARY ANALYSIS.
Special rept. on Research in Space Science,
by Leonard H. Solomon. 22 Oct 65, 33p SAO-SR-191
Grants NsG-87-60, NsG-563

Descriptors: (*Reentry vehicles, Atmosphere entry), Rockets, Experimental data.

20. PHYSICS

AD-264 682 **Field 20A, 21E, 20D**
CFSTI Price: HC$7.60
Armour Research Foundation, Chicago, Ill.
FUNDAMENTAL STUDY OF JET NOISE GENERATION AND SUPPRESSION. VOL. II. BIBLIOGRAPHY,
by Margaret Emmitt. Dec 60, 76p
Contract AF 33 (616)-6976
WADD TR-61-21-vol-2

Descriptors: (*Bibliographies, Jet engine noise), (*Jet engine noise, Bibliographies), Acoustics, Airplane engine noise, Airplane noise, Jet plane noise, Fluid mechanics, Reduction, Sound, Nonlinear differential equations, Turbulence.

A comprehensive survey of the American and foreign literature of jet noise generation and suppression resulted in a two-volume report. Volume II of this final report consists of a two-part bibliography of references selected from 1150 documents. Part I of the bibliography contains a chronological list of 537 documents: an annotated, further selection of 73 documents comprises Part II. (Author)

AD-287 456 **Field 20E, 20B**
CFSTI Price: HC$1.60
Linde Div., Union Carbide Corp., East Chicago, Ind.
RUBY IMPROVEMENT FOR LASERS TASK I.
Quarterly progress rept. no. 1, 1 May-31 Jul 62,
by R. L. Hutcheson. 31 Jul 62, 20p
Contract DA-36-039-sc-89089,
Proj. DA-3A 99-21-001,
Task 3A-99-21-001-01

Descriptors: (*Ruby, Lasers), (*Lasers, Ruby), Crystal growth, Crystals, Manufacturing methods.

In producing ruby for optical maser application, there are several growth variables which affect crystal quality. The growth information on two of ten lots of ruby crystals grown under different growth parameters is presented. These lots of ruby crystals were grown with thermal gradients vertically down the crystal of 300C and 150C, other growth conditions remaining constant. Preliminary examination indicates the crystals grown with the lower thermal gradient to have superior crystal quality. (Author)

AD-446 496 **Field 20L, 10B, 7B, 11G**
CFSTI Prices: HC$1.60
Westinghouse Research Labs., Pittsburgh, Pa.
BASIC STUDIES ON THERMOELECTRIC MATERIALS. ELECTROLYTIC PREPARATION OF TELLURIDES.
Quarterly rept. no. 10,
by Armand J. Panson. Dec 63, 18p Scientific paper SR-63-929-100-P5
Contract Nobs-84687
See also AD-430 186.

Descriptors: (*Thermoelectricity, Materials), (*Tellurides, Synthesis (Chemistry)), Electrolysis, Copper compounds, Zinc compounds, Tin compounds, Lead compounds, Bismuth compounds, Germanium compounds, Silver compounds, X-ray diffraction analysis, Crystal structure, Differential thermal analysis, Symmetry (Crystallography).

Identifiers: Bismuth telluride, Cupric telluride, Germanium monotelluride, Lead telluride, Silver telluride, Stannous telluride, Zinc telluride.

The compounds CuTe, ZnTe, SnTe, PbTe and Bi2Te3 were prepared by electrolysis with tellurium cathodes and metal anodes in ammonium acetate acid buffer solutions. The tellurides were formed by homogeneous reaction between metal cations and telluride ions in the bulk of the solutions. GeTe, Ag2Te, SnTe, and ZnTe were also prepared by adding metal salt solutions to electrolytically generated telluride solutions. X-ray measurements indicated that stoichiometric SnTe is formed in contrast to extensive non-stoichiometry possible in compounds prepared at elevated temperatures. Also, GeTe prepared at room temperature was shown to have a somewhat smaller tetragonal distortion than observed in GeTe preparations quenched from higher temperatures. In addition, a low temperature CuTe phase was observed which is apparently of lower symmetry than orthorhombic which was obtained on annealing above 250C. (Author)

AD-466 181 **Field 20N, 20C, 9E**
CFSTI Prices: HC$1.60 MF$0.50
Ohio State Univ. Research Foundation, Columbus. Antenna Lab.
AN INTEGRAL REPRESENTATION FOR MAXWELL'S EQUATIONS WITH ARBITRARY TIME DEPENDENCE,
by David C. Stickler. 15 May 65, 19p Scientific. Rept. no. 1793-1
Contract AF 19 (628)-4002,
Proj. AF-4600,
Task 460004
AFCRL 65-342
N65, 29256
Rept. on The Scattering of Electromagnetic Energy.

Descriptors: (*Electromagnetic waves, Scattering), (*Integral equations, Electromagnetic waves), Antennas, Approximation (Mathematics), Electromagnetic fields, Electromagnetism, Partial differential equations, Theory.

Identifiers: Huygen's principle.

Integral expressions are presented for the fields interior to a source-free homogeneous volume in terms of the tangential electric and magnetic fields on the surface of the volume. Although this integral representation is available by straightforward methods, to the best of the author's knowledge, it has not appeared before, and it is much simplier than some. The representation also constitutes a statement of Huygen's principle for electromagnetic waves in the sense that the contribution from each surface element is itself a solution of Maxwell's equations. The relationships are also pointed out between the present representation and previous ones. (Author)

AD-471 246 **Field 20M, 11D, 11F**
CFSTI Prices: HC$4.60 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
THERMAL STRESS ANALYSIS OF SANDWICH CYLINDERS.
Technical memo.,
by R. M. Rivello. Aug 65, 41p TG-721
Contract NOw-62-0604-c

Descriptors: (*Sandwich construction, Thermal stresses), (*Thermal stresses, Sandwich construction), Cylindrical bodies, Aluminum compounds, Oxides, Radomes, Aerodynamic heating, Structural properties, Thermal analysis.

Identifiers: Aluminum oxides.

The aerodynamic heating associated with high speed flight produces large temperatures and thermal gradients in missile structures. Refractory materials capable of operating at high temperatures usually have low strength/ weight ratios and are therefore structurally inefficient. One method of increasing their structural effectiveness is to employ them in sandwich configurations in which the core material is made porous to decrease its density. As an example, laminated slip cast ceramic radomes are currently under development by several companies. The electrical bandwidth and cost advantages that these radomes appear to hold over homogeneous wall radomes have been discussed in a previous work Ref. (1). The structural advantages that such radomes have in resisting aerodynamic and inertial loads are also apparent, but the effectiveness with regard to thermal stresses is not so obvious and requires quantitative investigation. The work reported herein was undertaken to develop the analytical methods to be used in such a study. (Author)

AD-473 486 **Field 20M**
CFSTI Prices: HC$4.60 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
TRANSIENT HEAT TRANSFER CALCULATION PROCEDURES FOR GAS TRANSPIRATION COOLING WITH COMPACT SYSTEMS.
Technical memo.,
by R. W. Allen. Aug 65, 42p TG-723
Contract NOw-62-0604-c

Descriptors: (*Heat transfer, Evapotranspiration), (*Evapotranspiration, Heat transfer), (*Cooling, Evapotranspiration), Leading edge, Porous materials, Aerodynamic heating, Thermodynamics, Fluid mechanics.

Patent 3,229,509 **Field 20A, 20D**
FLOW NOISE DETECTOR.
Patent assigned to Navy,
by Ronald A. Darby. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Noise analyzers, Fluid flow), Patents, Pipes, Transducers, Noise, Measurement.

The detector is for the measurement and evaluation of acoustic pressure and sound patterns in fluid or fluent material flowing through internal combustion engines, pumps, valves, piping and the like. It is particularly useful in naval craft which expel water directly into the sea. A cylindrical tank, filled with a fluid, surrounds the pipe and acts as a reverberant chamber. Transducers are

suspended from a trolley and are movable along a length of the pipe. The transducers are associated with an amplifier, a cathode ray display tube, an averaging circuit and a readout device.

Patent 3,230,051 **Field 20B**
CLOSED-SYSTEM EVAPORATION CRYSTALLIZER.
Patent assigned to Air Force.
by John L. Sampson. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Crystal growth, Evaporation), Patents, Crystallization.

Crystal formation is effected in a continuous closed system of constant temperature. A concentration gradient is maintained from low saturation to high saturation and supersaturation by a flow of solvent, the flow being brought about by combined action of evaporation, condensation, gravitation and hydrostatic pressure, and augmented by a baffle system which promotes the flow.

Patent 3,230,145 **Field 20I, 14B**
APPARATUS FOR MAGNETICALLY CONFINING A PLASMA.
Patent assigned to AEC.
by Harold P. Furth and Marshall N. Rosenbluth. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Plasma medium, Confinement), Magnetic fields, Configuration, Patents.

A plasma is produced and magnetically confined in a closed configuration under conditions of stable equilibrium insensitive to the electrical conductivity of the plasma. The plasma is confined by a magnetic field whose locus of the centroids of transverse sections of the flux surfaces of constant volume flux tubes is a closed curve whereby the magnetic field lines are joined continuously to form an annular magnetic field configuration which is symmetric about the locus of the centroids. These magnetic field lines extend annularly through an evacuated region. The magnetic field is established by a coil wound in the form of a tubular annulus with the tubular cross section corresponding to the transverse section of the flux surfaces of the magnetic field.

PB-168 708 **Field 20L, 20B**
CFSTI Prices: HC$2.00 MF$0.50
Eagle-Picher Research Labs., Miami, Okla. Chemical and Metals Div.
RESEARCH INVESTIGATIONS IN THE PHYSICAL CHEMISTRY AND METALLURGY OF SEMICONDUCTING MATERIALS.
Quarterly rept. no. 1, 15 May-15 Aug 60,
by K. E. Bean and R. J. Starks. 15 Aug 60, 35p
Contract DA-36-039-sc-85131
AD 244 672
See also PB-168 709.

Descriptors: (*Semiconductors, Materials), (*Boron, Single crystals), Synthesis (Chemistry), Crystal growth, Purification, Zone melting, Impurities, Boron compounds, Bromides, Silicon, Carbon, Decomposition.

Identifiers: Czochralski growth.

Elemental boron was prepared by synthesis of BBr3 from bromine and either boron carbide or crude elemental boron, purification of the BBr3 by fractional distillation and adsorption, and thermal decomposition of the BBr3 in hydrogen with deposition of elemental boron on boron filaments heated by AC current. The boron filaments, together with the boron deposit, were placed vertically in a crystal growing unit and boron crystals were grown by a crucible-free method. The method consisted of melting the top portion of the crystal deposit in a concentrated radio-frequency field, introducing a seed crystal and growing a Czochralski-type crystal by pulling the seed upward out of the melt. The boron crystals obtained, contained less than 5 parts per million of silicon, and less than 1 part per million of all other spectrographically detectable materials. Carbon was present in the amount of .03 percent by weight. In an effort to further reduce the carbon content, the high purity boron product was recycled through the above procedures from BBr3 to elemental boron. Initial carbon determinations indicate further decrease in carbon concentration by an order of magnitude.

PB-168 709 **Field 20L, 20B**
CFSTI Prices: HC$2.00 MF$0.50
Eagle-Picher Research Labs., Miami, Okla. Chemical and Metals Div.
RESEARCH INVESTIGATIONS IN THE PHYSICAL CHEMISTRY AND METALLURGY OF SEMICONDUCTING MATERIALS.
Quarterly rept. no. 2, 15 Aug-15 Nov 60,
by K. E. Bean and R. J. Starks. 15 Nov 60, 31p
Contract DA-36-039-sc-85131
AD 249 708
See also AD-624 251.

Descriptors: (*Semiconductors, Materials), (*Boron, Single crystals), Synthesis (Chemistry), Boron compounds, Bromides, Purification, Decomposition, Crystal growth, Zone melting, Films, Doping, Substrates, Impurities, Quartz, Nitrides, Electrical properties.

Identifiers: Czochralski growth.

Elemental boron, with no spectrographically detectable impurities was produced. Analyses for carbon indicated the concentration to be less than 60 parts per million. Boron films were prepared by hydrogen reduction of BBr3 with deposition on quartz and boron nitride substrates. The films deposited on the clear quartz substrates tended to peel off. Films deposited on the boron nitride substrates were strong and stable but were of comparatively high conductivity. It was indicated that the boron had been uniformly doped with some impurity from the boron nitride. The ionization energy of the boron films on boron nitride was approximately .35 ev as compared to a value of .5 ev in good boron crystals. Improved crystal structure was obtained in crystals grown by the Czochralski crucible-free method. The improvements resulted from improved techniques and from seeding the melt with very small seed crystals. Although none of the crystals were entirely single, they contained larger crystallites than in previously grown crystals. One Czochralski crystal was a twin composed of only two crystallites over a major portion of the ingot. (Author)

PB-168 974 **Field 20J, 12A**
CFSTI Prices: HC$3.00 MF$0.75
Kenyon Coll., Gambier, Ohio.
SUMMATION OF FIELDS OF NUMBERS IN BOOLEAN TRIBES. I. AUXILIARY NOTIONS AND THEOREMS,
by Otton Martin Nikodym. 1960, 59p
Grant NSF-G9661
Pub. in Rendiconti del Circolo Matematico di Palermo v9 (ser. 2) p1-57 1960.

Descriptors: (*Field theory, Algebra), (*Algebra, Field theory), Vector analysis, Integration, Real numbers, Quantum mechanics, Theorems.

PB-169 295 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
Laboratoire de l'Accelerateur Lineaire, Universite de Paris, Orsay (France).
PROTON FORM FACTORS FROM PROTON OBSERVATION,
by D. Frerejacque, D. Benaksas, and D. Drickey. 1965, 25p LAL-1144

Descriptors: (*Protons, Electromagnetic properties), (*Electrons, Elastic scattering), Proton scattering, Polyethylene plastics, Electron bombardment, Momentum, Nuclear cross sections, France.

Identifiers: Form factors.

A determination of the electric and magnetic form factors of the proton was made by studying the elastic scattering of electrons from a polyethylene target by observation of the recoiling proton at 0 degrees and 30 degrees for values of q sq. between 1 fermi to the-2 power and 1.8 fermi to the -2 power. From these measurements the charge radius Rc and the magnetic radius Rm of the proton were deduced and equality was found within the experimental errors (Rc = 0.800 plus or minus 0.025 fermi; Rm = 0.810 plus or minus 0.029 fermi). (Author)

PB-169 344 **Field 20H**
CFSTI Prices: HC$6.60 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
MESURE DES SECTIONS EFFICACES TOTALES pi-,p ET pi+,p ENTRE 700 ET 1700 MeV ET APPLICATIONS AUX RELATIONS DE DISPERSION (Measurement of the positive-pion,P and negative-pion,P Total Cross-Section From 500 to 1700 MeV, and Applications to the Dispersion Relationships).
Doctoral thesis in French,
by Alexandre Stirling. 1966, 63p CEA-R-2838
Text in French; Attached Summary in English.

Descriptors: (*Pions, Nuclear cross sections), (*Meson reactions, Nuclear cross sections), (*Proton cross sections, Measurement), (*Nuclear cross sections, Measurement), Nuclear spins, Phase shift, Neutrons, Diffusion, France.

The positive-pion,p and negative-pion,p total cross sections were measured between 500 and 1700 MeV to eliminate discrepancies in the experimental data. These new values permitted a more precise calculation of the forward dispersion relation. These relations are well satisfied by the experimental data up to 18 GeV for charge exchange scattering. The dispersion relation for the spin-flip amplitude gives an efficient test for the phase-shift analysis solutions.

PB-169 634 **Field 20K, 13H, 13J**
CFSTI Price: HC$4.60
David Taylor Model Basin, Washington, D. C. Structural Mechanics Lab.
EFFECT OF INITIAL DEFLECTIONS AND RESIDUAL WELDING STRESSES ON ELASTIC BEHAVIOR AND COLLAPSE PRESSURE OF STIFFENED CYLINDERS SUBJECTED TO EXTERNAL HYDROSTATIC PRESSURE.
Research and development rept.,
by Martin A. Krenzke. Apr 60, 42p Rept. no. 1327
AD 224 926

Descriptors: (*Stiffened cylinders, Hydrostatic pres sure), (*Welding, Stiffened cylinders), (*Structural properties, Stiffened cylinders), Stresses, Welds, Elasticity, Deflection, Failure (Mechanics).

Four stiffened cylinders, fabricated by welding, were subjected to external hydrostatic pressure to determine how initial axisymmetric deflections between frames and residual stresses in the shell affect the elastic behavior and the collapse strength. Measured strains indicated that initial deflections between frames affect the elastic behavior of a stiffened cylinder. These strain measurements were in good agreement with strains calculated by the theory of Lunchick and Short, an analysis which considers the influence of initial axisymmetric deflections. The tests also showed that initial deflections and residual stresses must be considered in calculating the collapse strength of welded stiffened cylinders.

21. PROPULSION AND FUELS

Patent 3,229,446 Field 21B, 21D, 1E
COMBUSTION INHIBITING METHOD.
Patent assigned to Air Force.
by Charles R. Sebastian and George A. Patterson, Jr. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Combustion, Inhibition), Aviation fuels, Fuels, Liquids, Patents, Oxygen, Pressure, Maintenance, Aircraft.

The method prevents an explosive mixture of flammable gases and oxygen in the ullage space of a high speed aircraft having a liquid fuel in it. The method is particularly useful during the loading of fuel containing oxygen. The fuel is flowed through a nozzle at greater than atmospheric pressure, is compressed and a stream of nitrogen is injected during the compression. The liquid is then exposed to atmospheric pressure in the tank to remove the oxygen.

Patent 3,230,281 Field 21I, 13H
NEW PROCESS FOR CASTING ROCKET PROPELLANT GRAINS.
Patent assigned to Navy.
by John W. Carroz. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Rocket propellant grains, Casting), (*Casting, Rocket propellant grains), Patents.

The propellant grain is used in making rocket propellants. It consists essentially of hydrazine and is cast by forming a screen wire skeleton within a container, casting gelled hydrazine at about 32 degrees F. around the skeleton, and curing at room temperature for about two weeks.

PB-169 562 Field 21D, 7A, 13H
CFSTI Prices: HC$7.00 MF$1.50
FMC Corp., Princeton, N. J. Chemical Research and Development Center.
CHAR OIL ENERGY DEVELOPMENT.
Final rept., Jun 62-Dec 65,
by R. Tracy Eddinger, John F. Jones, Michael R. Schmid, Louis D. Friedman, and Leonard Seglin.
9 Dec 65, 299p PCR-469
Contract 14-01-0001-235

Descriptors: (*Coal, Material separation), (*Chemical engineering, Fuels), (*Coal gas, Chemical engineering), (*Fuel oil, Chemical engineering), Hydrocarbons, Minerals, Pyrolysis, Fluidized bed processes, Slurry fuels, Distilling plants, Refineries, Mechanical drawings, Feasi bility studies, Economics.

Identifiers: Char oil, COED project.

This project was a technical and economic evaluation of a proposed commercial process for more effectively utilizing coal. The process consists of pyrolysis of high-volatile bituminous coal to produce oil, gas, and char. Vis-breaking (catalytic hydrocracking) of the oil yields a less viscous product that can be used as a petroleum refinery feedstock and as a slurrying medium to transport the solid char, or coal, by pipeline. The product gas can be reformed to produce a high-Btu pipeline gas or hydrogen gas. A multistage, fluidizedbed process gave oil yields greater than 20 percent, which was considered a practical minimum. The commercial potential of the process was evaluated for a plant processing 3.5 million tons of coal per year using data from the process development unit. Utah Aseam coal was estimated to yield a return on investment of 19.1 percent before taxes. For this estimate, it was assumed that product gas was sold as high-Btu pipeline gas, and no credit was taken for possible transportation savings from pumping slurries. Product credits were $3.00 per barrel of oil, $0.40 per million Btu of gas, and $0.10 per million Btu of char (10 percent less than for coal). The value to a refiner of hydrocracked oil is estimated at $3.56 to $4.60 per barrel.

PB-169 563 Field 21D, 7D, 13M
CFSTI Prices: HC$3.00 MF$0.75
FMC Corp., Princeton, N. J. Chemical Research and Development Center.
CHAR OIL ENERGY DEVELOPMENT. DESIGN DRAWINGS.
Rept. for Jun 62-Dec 65,
by R. Tracy Eddinger, John F. Jones, Michael R. Schmid, Louis D. Friedman, and Leonard Seglin.
Dec 65, 42p PCR-469, suppl.
Contract 14-01-0001-235
See also PB-169 562.

Descriptors: (*Chemical engineering, Refineries), (*Refineries, Mechanical drawings), (*Mechanical drawings, Refineries), (*Coal, Material separation), Coal gas, Fuel oil, Slurry fuels, Pyrolysis, Fluid ized bed processes, Processing, Distilling plants.

Identifiers: Char oil, COED project.

PB-169 590 Field 21H
CFSTI Price: HC$4.60
Guggenheim Jet Propulsion Center, Calif. Inst. of Tech., Pasadena.
SIMILARITY ANALYSIS FOR CHEMICAL REACTORS AND THE SCALING OF LIQUID-FUEL ROCKET ENGINES,
by S. S. Penner. Nov 54, 47p Technical rept. TR-8
Contract DA-495-ORD-446
AD 46523

Descriptors: (*Rocket motors (Liquid propellant), Mathematical analysis), (*Chemical reactions, Mathe matical analysis), Rocket propulsion.

Scaling criteria are derived by the use of similarity analysis for homogeneous and heterogeneous chemical reactors from the conservation equations for multi-component, reacting, gas mixtures. The analysis shows that a complete set of similarity parameters for homogeneous systems includes Damkohlers (Z. Elektrochem. 42:846, 1936) first and third similarity constants, in addition to the parameters familiar from similarity studies on nonreacting gas mixtures. For low-velocity flow problems in the absence of external forces, the results of the study are identical with Damkohlers 5 similarity criteria for chemical reactors. Scaling procedures are discussed for chemical reactors with negligible heat loss to the walls and without surface-catalyzed reactions. No useful results are obtained under the restriction of strict similarity; with loss of geometric similarity, obvious conditions for scaling are estimated.

PB-169 628 Field 21H, 11D, 11I
CFSTI Price: HC$16.50
Rocketdyne, Canoga Park, Calif.
DEVELOPMENT OF PLASTIC CASE FOR XM15 JATO ROCKET MOTOR (PLASTIC JATO CASE).
Final technical engineering rept., 5 Dec 55-8 Jul 59,
by J. W. Hurst. Apr 60, 169p
Contract AF 33(600)-31436,
Proj. AMC-7-436b
AMC TR-59-7-436b,
AD 237 682

Descriptors: (*Rocket motors (Solid propellant), Filament wound construction), (*Filament wound construction, Rocket cases), (*Plastics, Rocket cases), Glass textiles, Reinforcing materials, Composite materials, Weight, Coses, Epoxy plastics, Captive tests, Storage, Tests.

Identifiers: M-15 motors.

A XM15 JATO rocket motor case 50 percent lighter than a comparable steel case and competitive in cost has been fabricated from Epon 828 epoxy resin reinforced with helically wound glass fibers. Successful firings and storage tests confirmed the ability of the plastic case to meet all design requirements. Sixty JATO motors were made of filament wound glass fiber reinforced plastic case, asbestos phenolic plastic aft head and nozzle, Buna-N rubber liner, and with the only metal parts being the forward head mounting bolts, rupture discs, steel insert for mounting the igniter assembly, and the mounting brackets. These steel parts accounted for 8 percent of the total weight. The comparable steel case weighs 94 pounds and costs $37.00 per motor. The plastic motor case weighs 41 pounds (57 percent reduction) and should cost approximately $37.00 per unit for a production rate of 5000 units per month. (Author)

22. SPACE TECHNOLOGY

Patent 3,229,682 Field 22B, 10B
DEVICE FOR DIRECTIONALLY CONTROLLING ELECTROMAGNETIC RADIATION.
Patent assigned to NASA.
by Morris Perlmutter and John R. Howell. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Solar radiation, Reflectors), Patents, Electromagnetic waves, Solar cells, Thermal radiation, Reflection, Absorption, Satellite (Artificial).

The device can be used in the operation of a satellite. Solar energy is collected by the device and directed toward a solar cell which converts the solar energy to electrical energy which can be used to operate the radio equipment on the satellite. A unique arrangement of reflecting and absorbing surfaces are provided which are responsive to thermal radiation.

Patent 3,229,930 Field 22B
STRETCH DE-SPIN MECHANISM.
Patent assigned to NASA.
by Joseph V. Fedor and Henry J. Cornille, Jr. 18 Jan 66
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Spacecraft, Control systems), (*Control systems, Spin), Patents, Springs, Winding, Wire, Weight, Disconnect fittings.

The 'stretch' Yo Yo mechanism compensates for variations from an expected space vehicle's initial spin rate. The mechanism includes two elongated non-stretchable wires wound around the periphery of the satellite in a plane normal to the satellite's spin axis. One end of each of the wires is fastened to the satellite by an appropriate detachment mechanism. The detachment mechanism can comprise, for example, a hook and eye combination, with the hook being attached to the wire and an eye being affixed to the satellite. Attached to the other end of each of the wires is a weight. A pyrotechnic bolt can be used as a release mechanism.

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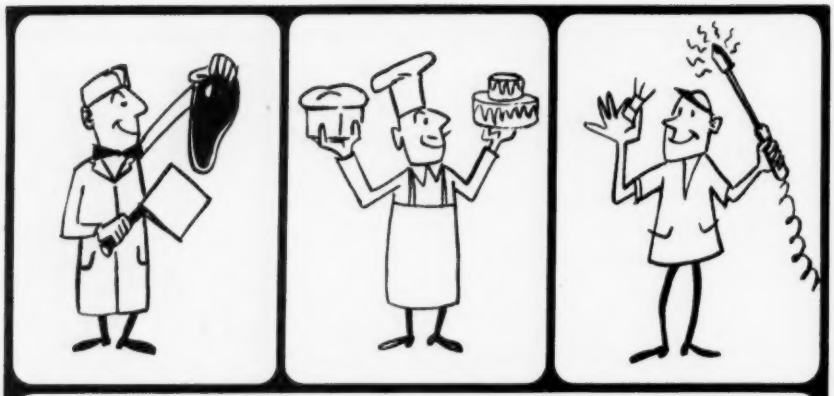

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